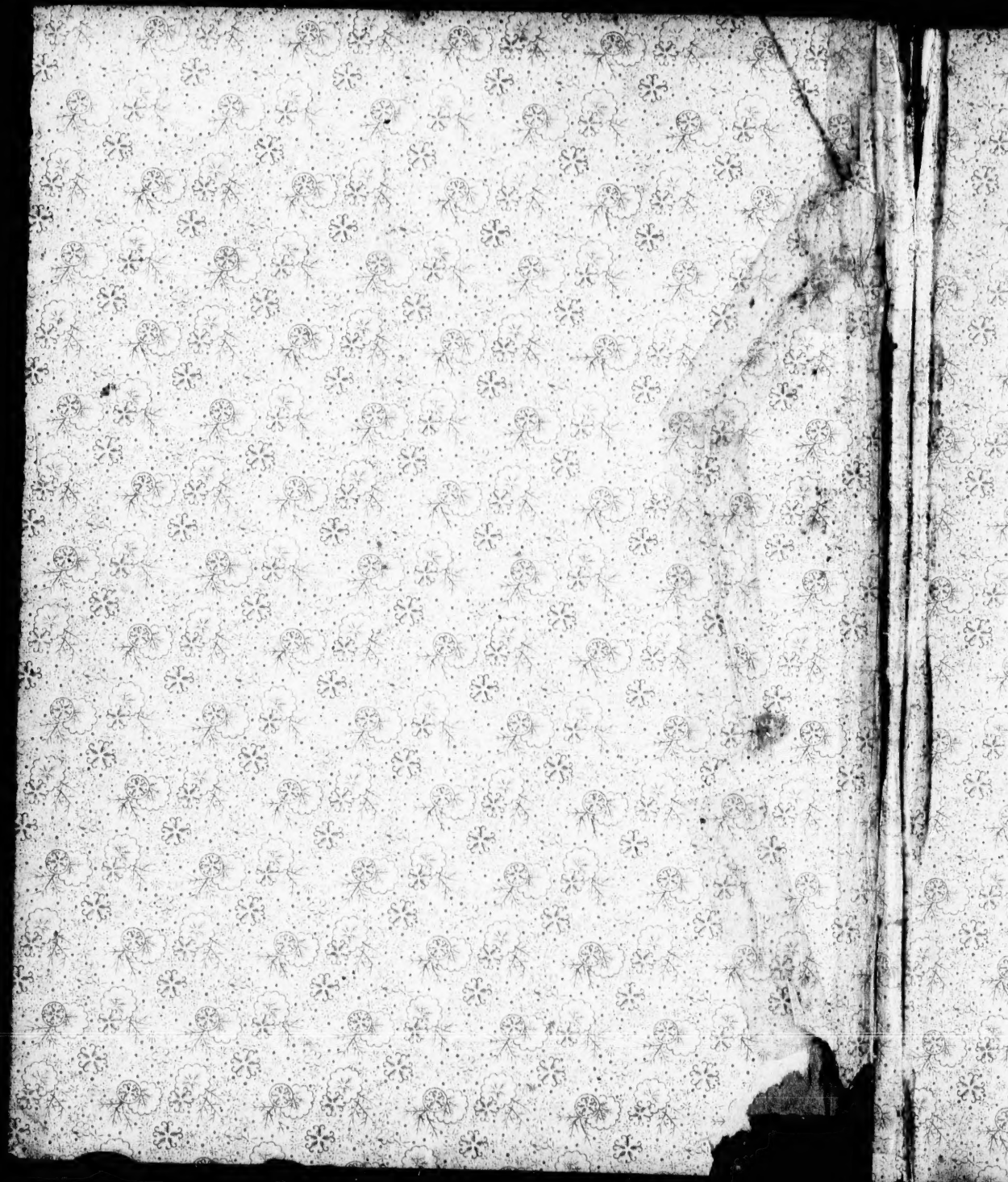




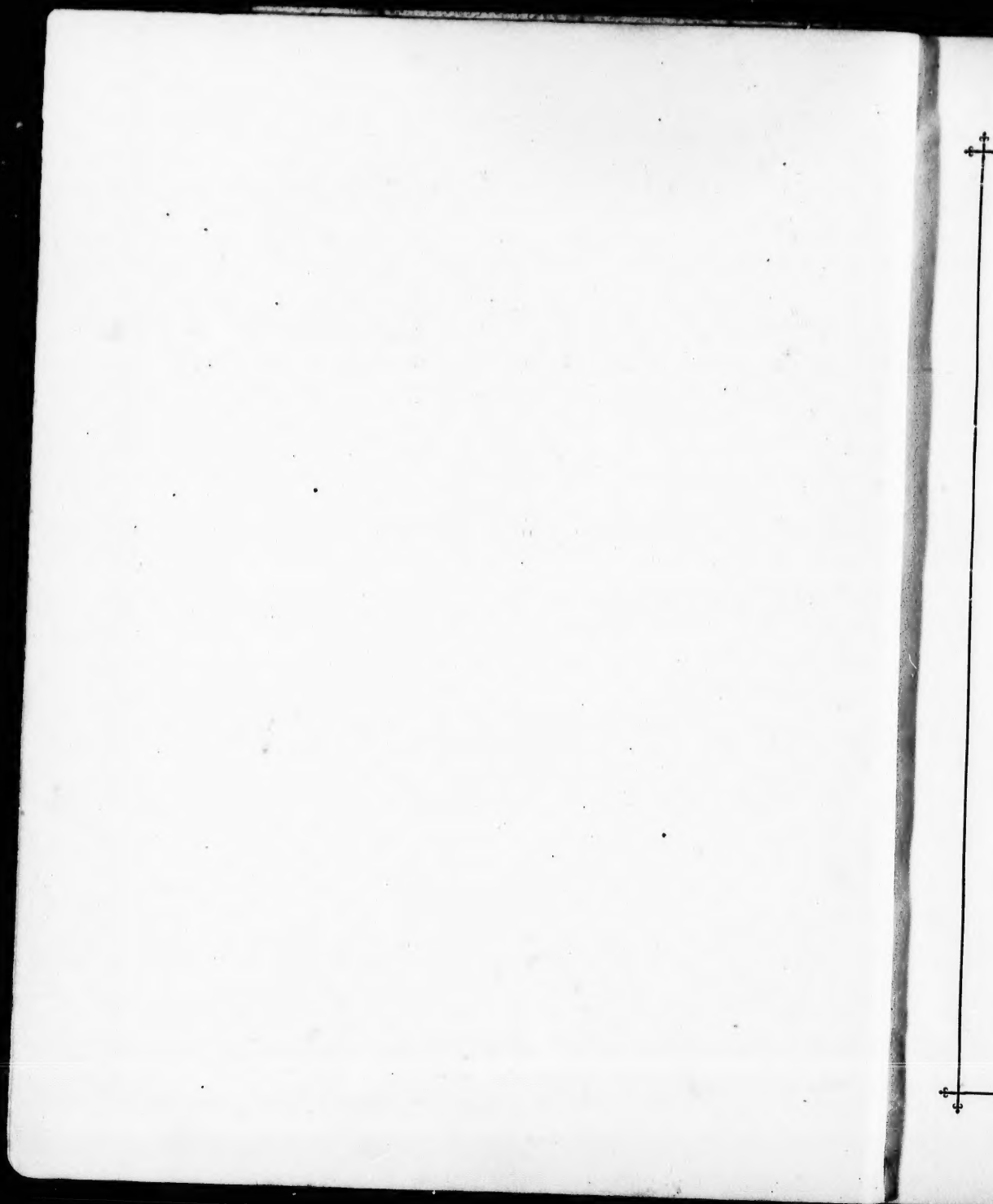




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THE FARMERS' STOCK BOOK

A MANUAL

ON THE BREEDING, FEEDING, MANAGEMENT AND CARE OF LIVE STOCK,
AND COMMON SENSE TREATMENT AND PREVENTION OF
DISEASES OF FARM ANIMALS.

—BY—

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The Farmers' Stock Book.

INTRODUCTORY.

IN every industry or profession, the best means of money making is, or should be, a careful preliminary study before entering upon the work, for upon this the industry, occupation or profession must stand or fall.

SPECULATION.

The speculator seeks to accomplish his end by a careful study of the markets, present and past, with a view of arriving at quick returns for his investments. Markets are subjected to so many and varied fluctuations, and from an infinity of causes not possible to foresee, that, as in meteorology, there can be no certain prediction far ahead. Hence speculation is rightly named, the art of making money by speculating on chances—simply another name for gambling. One set of speculators engage in forcing the price of grain, provisions, merchandise of any kind, stocks, etc., up or down. This is the aggression of speculative monopoly. Their victims are all who have commodities to sell. They are the great corrupting influences of State and society. They are Ishmaelites, their hand against every productive industry, producing nothing valuable; hoarding, that they may wield the power of money against legitimate industries; wrecking and hoarding. A few pile colossal fortunes, to be scattered only by heirs who inherit the bad qualities of their fathers; bad intelligence, intensified in as reckless a desire to scatter, as their sires had stolen or gulled from others. The compensation comes late.

CUPIDITY AND GULLIBILITY.

Another class work on the cupidity or gullibility of ignorant men. Their bait is something valuable

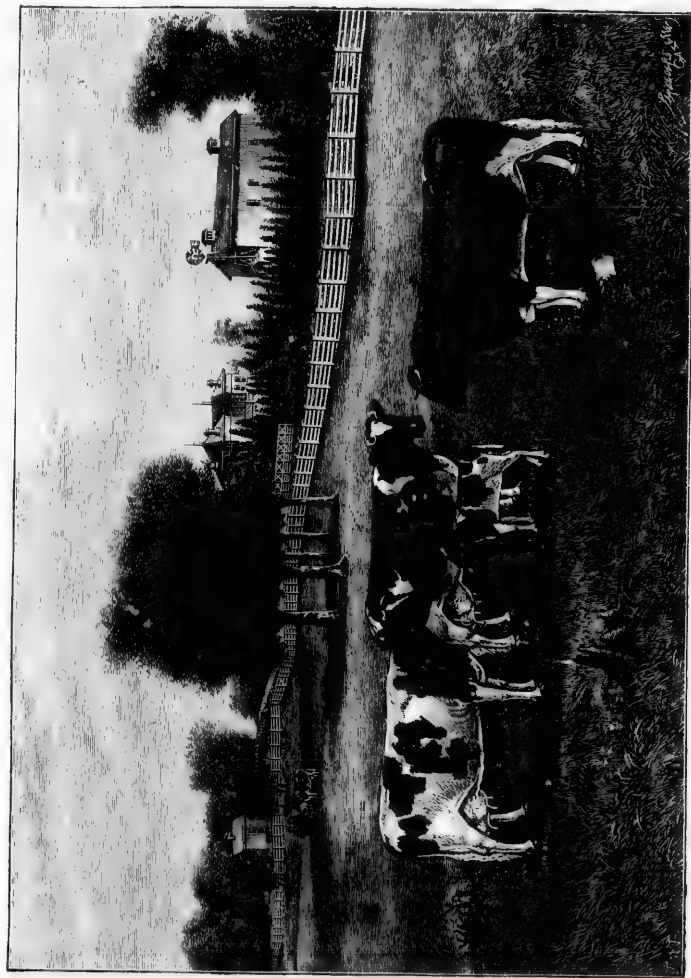
(?) for many times less than its worth, but which the buyer finds like the "apples of the Dead Sea, ashes and bitterness."

HONESTY VS. DISHONESTY.

Legitimate money-making consists in giving value for value, either in ordinary or in superior articles or products of value. Here, as in all honorable industry, it is the sagacious application of acquired knowledge through study, to the practical performance of the best means to the end sought, that marks the difference between the eminently successful man in business of any kind, and that great mass who never seek to improve upon the mistakes of their neighbors. This is all there is between false and true money-making in any honorable industry, and the rule will hold good as regards speculation, which is simply the endeavour of one class of gamblers to beat another class. Aggressive speculative monopolists seek to swindle all classes, and hence are enemies of individuals and the State.

STOCK BRINGS PROFIT.

Fortunately, agriculture in none of its branches can be directly and permanently reached—speculation is in values, not in commodities. Civilization and swift transportation move commodities too promptly. It is only the speculator who gets rich, one out of the other. The farmer and the horticulturist, the stock-breeder especially, if they do not make money so swiftly, make it surely. The average farmer compares more than favorably with the average worker in other human industries. There are notable instances of honorable wealth in every country district. A careful review will show that in the great majority of cases the real profits have come principally in the breeding and feeding of domestic animals.



ROUTE OF HOLSTEINS, and View of Cedarvale, Elgin, Illinois.

Stock Interests and Dairying.

CHAPTER I.

VALUE OF THE ANIMAL INDUSTRY OF THE UNITED STATES AND CANADA.

SECTION I.—IMPORTANCE AND VALUE OF THE LIVE STOCK INTERESTS OF THE UNITED STATES.

According to the official count of 1880-'81, there were contained in the United States 10,521,554 horses, 1,835,166 mules, 12,611,632 milch cows, 23,280,238 oxen and other cattle, 45,016,224 sheep, and 44,122,200 swine. These were worth in round numbers almost \$2,000,000,000, or \$40 for each man, woman and child in the country. According to official figures, there were, at the same date, 4,008,907 farms in the United States. Hence the average value of stock was nearly \$500 per farm. The area in crops, fallow and hay, was 179,000,000 acres. The value of live stock would therefore be over \$11 for each acre of land actually worked. The real acreage in farm, however, was a total of 407,723,364 acres. Thus again we see that the value of live stock was nearly \$5 for every acre in farm. The total area of the United States is 2,311,544,959 acres. Here again we see that the live stock of the country counts nearly as many dollars as there are acres in the whole United States, including water, marsh, mountain, desert, and other wild lands.

THERE IS STILL ROOM FOR MORE.

That there is still room for expansion is proved by the fact that meat products are the only commodity that steadily advance in price with the growth of the country. That is, the live stock of the country does not increase in equal proportion to the population and other industries. It is so in every country. Live stock products are the only commodity that have steadily advanced in price during the last hundred years in England.

APPRECIATION OF LIVE STOCK WEST.

Since the settlement of the west, notwithstanding the vast areas open to cultivation, live stock has steadily appreciated and will continue to do so. Why? With advancing wealth, and constantly decreasing cost of transportation, the demand for flesh food will increase. Wealth produces a desire for fine horses, both for driving and teaming purposes. The quality of the flesh consumed will be more and more strongly criticised by buyers as wealth increases, and for the reason that a better quality will be demanded. It must be better fed, the muscle (flesh) must be well marbled. Hence particular breeds carrying the points desired will become more valuable. The cattle, sheep, hog and poultry breeders must meet the demand or they will get left in the race for wealth. The demand for particular qualities in horses must be catered to, or else the breeder cannot sell.

WHY WE SEEK FOREIGN BREEDS.

This, and this alone, is the secret why such an impetus has been given to the importation of valuable foreign breeds since the last quarter of a century. Instead of beginning the improvement upon the native mixed breeds of the country, we began with the best breeds of older countries. Thus the sagacious breeders of the United States and Canada have drawn upon every civilized country of the earth for the most superior specimens of every domestic breed of animals.

SECTION II.—PRESENT AND PROSPECTIVE VALUE OF LIVE STOCK.

We have shown the present aggregate value of the different classes of live stock of the United States. Let us now find the average value per head of the different classes of live stock.

AVERAGE PRICES—GREATEST AND LOWEST.

According to the official census count, the average price of horses in the United States is \$58.44 each; mules, \$69.79; of milch cows, \$23.95; of oxen and other cattle (calves and other young stock), \$17.33; sheep, \$2.39, and hogs, \$4.70, each, as the average. Let us now find the least and greatest averages in any state.

The least average price for horses was in Texas, \$26.80, and the greatest average in New Jersey, \$95.67, each.

For mules the least average price was in Missouri, \$57.27, and the greatest average price, again, was in New Jersey, \$124.32, each.

For milch cows the least average price was in Florida, \$12.21, and the greatest average price in Massachusetts, \$35, each.

For oxen and other cattle, the least average price was in Florida, \$7.51, and the greatest average price in Massachusetts, \$36.88, each.

For sheep, the least average price was in North Carolina, \$1.35, and the greatest average price in New Jersey, \$4.11, each.

For hogs, the least average price was in Florida, \$2.96, and the greatest in Connecticut, \$13.75, each.

THE RULE OF PRICE.

Now, these relative highest and lowest prices are, as a rule, in non-producing states, except in the case of cattle, and here the quality is notoriously low. They are semi-wild cattle, herded in vast droves and annually driven north. The low prices on the one hand are the result of indifference to breeds, and the high prices on the other are due to the fact, that, relatively, few animals being kept, there is careful selection, or a buying of the best.

Let us now take the great stock producing states. Illinois has 1,067,220 horses, worth \$62,485,731. Texas has 1,002,456, worth \$26,865,821.

Texas produces the greatest number of mules, 202,460, worth \$9,041,864.

Missouri comes next with 184,224, worth \$10,550,508.

New York has the greatest number of milch cows, 1,431,700, worth \$38,169,122. Pennsylvania comes next with 828,333, worth \$21,735,458.

Texas has the greatest number of oxen and other cattle, 4,072,240, worth \$41,393,236. Missouri comes next with 1,697,749 head, worth \$31,119.

739, Iowa and Illinois ranking next with nearly equal numbers.

California stands first in sheep, 7,493,864, worth \$12,739,569. Texas stands next with 6,023,628, worth \$12,348,437, while Ohio with only 4,243,616 sheep, foots up an aggregate value of \$13,070,337.

Coming now to hogs, we find Illinois with 3,202,000, worth \$18,763,720, Iowa coming next with 2,778,400, worth \$16,587,046.

THE GREAT STOCK-BREEDING STATES.

A reference to the complete tables in the appendix will show many interesting facts; among others that the average prices per head cannot be taken as indicating the quality of blood. The average production must be taken into consideration. We see this, however, and it is an important fact: The states of Kentucky, Tennessee, Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas and Nebraska are the great centers of the live stock interests of the United States, and will continue so to be in the future. Texas is so immense a country that its totals must always foot up large, but the averages of live stock per acre must always rest largest in the states named, except, perhaps, in Michigan, Wisconsin and Minnesota, from the rigor of the climate in the extreme north, and Kansas and Nebraska from the arid nature of the soil over a large portion of the state. In Dakota there are two reasons why it cannot become a great stock state—the rigor of the winter climate, and the aridity of the western portions. But the more favored regions of all these states, partially excepted, will always be among the very best for the production of live stock, and will be especially adapted to horses and sheep, and to the rearing of store hogs and cattle, being subject to less constitutional disability than in warmer regions. Hence these localities should be especially interested in superior breeds to supply a constant demand for animals of superior strength and constitutional vigor.

SECTION III.—LIVE STOCK INTERESTS OF THE CANADIAN PROVINCES.

The province of Ontario, from its favorable position, contains the great bulk of the live stock of Canada. The "Report on Agriculture and Arts of Ontario" contains a carefully prepared paper on the live stock of Ontario, by Prof. Brown, of the Ontario Agricultural College. This report states that there are 350 herds of pure bred cattle in the prov-

ince, averaging ten cows per herd. These are composed principally of Shorthorn, Hereford, Polled Aberdeen and Galloway, for beef, and Shorthorn, Ayrshire and Jerseys for milk, butter and cheese. Our authority places the total census of purely bred cattle at 13,000 head for the whole province. Other statistics ("Bureau of Industries") put the number at 23,000 head. The census shows the number to be as follows:

Total cattle in the province, 1,608,059; sheep, 1,942,780; horses, 528,233; swine, 849,226; turkeys, 310,058; geese, 533,357; barnyard fowls, 4,508,705. Of sheep, the coarse wools aggregate 1,609,505, and fine woolled, 305,798 head. Yet even with her excellent showing of live stock, the population is increasing faster relatively than her stock. It is more convincing as showing, in connection with the yearly increase in the price of meat in the United States, what every reflecting mind knows, that there is no other farm industry that pays so large a return for the time, labor and money invested, as the rearing and feeding of live stock, and especially those classes used for human food.

SECTION IV.—THE IMPORTANCE OF LIVE STOCK FARMING.

The importance of live stock as a prime integer in the prosperity of the country, is apparent from the foregoing: It has been truly said that chemistry is the corner-stone of agriculture. So the breeding and feeding of live stock may be said to be that department of agriculture which keeps the fertility of the farm not only intact but steadily increasing. The man who constantly sells grain from his farm, however admissible in the first settlement of a country, while yet he is unable to stock his farm, will certainly get left if he continues the practice year after year. Why? He is constantly depleting his farm by sending away its fertility without replacing it.

On the contrary, when the produce of the farm is grain and grass, fed on the farm, and the fattened stock only is sold, the manure compensates so fully that little or no depletion goes on.

STOCK BRINGS WEALTH.

The reason why stock brings certain wealth is, that where the grain of the farm is sold it carries the great bulk of organic and inorganic matter of the crop. To compensate for this, sooner or later, this must be returned in one or another form. It is

only a question of time when the soil will be so depleted that it will not pay for the cultivation. If the grain is fed to stock, and pasturage is held sufficient to carry stock enough in summer to consume all the rough grain, corn, oats, and the light grain of barley, rye and wheat, and sufficient meadow is held to furnish the winter's hay, the whole is reversed. The farmer, instead of selling produce, holding from sixty to seventy per cent of dry organic and inorganic matter, sells flesh which contains only about twenty to thirty per cent of dry organic matter, for flesh and fat average fully seventy per cent of water in their bulk.

Again: In selling grain from the farm at an average of from half a cent to one cent per pound an immense amount of hauling is entailed. On the other hand, fat steers, sheep and hogs sell all the way from three to six cents per pound, and carry off the farm seventy per cent of water as against about fifteen per cent of water as in the case of grain. This is the sole secret—if it be a secret—why the stock farmer gets rich while the man who persists in selling grain eventually covers his farm with mortgages.

SECTION V.—STOCKING THE FARM.

In stocking the farm the owner must carefully canvass in his mind what class of stock will best pay the investment. As a rule diversified stock, as diversified farming, pays best. The variety of sheep most profitable, for instance, may depend upon a number of contingencies. If near a market where lambs and mutton bear a good price, some one of the Down breeds should be used on the common sheep of the country, to build up a profitable flock. If wool is the special object, American Merinos will be indicated. The swine (males) used must be of some one of the improved breeds, for no man nowadays can feed common bred hogs with profit any more than he can afford to keep sheep not of some of the special breeds. If cattle are to be fattened, one can hardly go astray if he have good grade Shorthorns or Herefords. They are now so widely disseminated that good males are not difficult to get. If milk, butter and cheese are an object, the choice will lie between the Holstein for quantity, and the Jersey for milk rich in cream. So far as horse stock is concerned, the Percheron or Clydesdale for labor, or a good, strong, staunch, trotting sire when style and speed are required, will meet every ordinary requirement.

CHAPTER II.

WHY STOCKMEN GET RICH.

SECTION I.—MANUFACTURING CONDENSED PRODUCTS.

THE reason why stock-breeders and stock-feeders get rich was as well understood more than two thousand years ago as it has been since by the more careful of observing farmers. The dairy cow converts the food eaten into milk. The products of the farm are consumed on the farm, nothing but the manufactured products are sold, and these only in their most concentrated form. The animals of the farm are considered simply as machines for converting bulky and inexpensive products into more costly products. The animal converts grass, hay, grain, and other natural foods into flesh. The dairycow converts the food eaten into milk. The milk is again separated into cream and skimmed milk. The cream is still farther separated into butter and buttermilk. The skimmed milk and buttermilk are converted into second-rate cheese, and the whey is fed to swine; or the skimmed milk and buttermilk, with the addition of other food, are directly employed in feeding calves.

The farmer in the feeding of animals employs them as machines to condense his products. He takes the milk—one of the products—and, becoming a manufacturing chemist, manipulates and combines, producing a still farther condensation, butter and cheese, employing the refuse continually in the production of flesh. A fat ox is worth as much as a common work-horse. Improved breeds are worth far more—always will be—than common breeds, just as heavy, plump, clean grain will always command a better price than inferior; just as fine fruits vegetables, or other products will command better prices than common ones. Improved cattle, sheep and swine are more profitable because they produce more and better flesh or wool for the food eaten than common ones. The fine road-horse, saddle-horse, or superior draft-horse will always bring superior prices, and for the simple reason, they are the most economical for the purposes for which the buyer intends them. We hope to give many ideas before we finish this work to show how best to bring about desired ends in the practical breeding and feeding of all domestic animals.

SECTION II.—ANCIENT WRITERS ON LIVE STOCK.

The great Mago, the ancient Carthaginian writer—

whom, the Romans when they finally conquered that nation, fortunately thought his writings worthy to be preserved and brought away—both Mago and Hamilear thought it not unworthy, nor beneath their dignity, when not occupied by war, to contribute, by their writings on agriculture, their quota toward the sustenance of human life. There were twenty-eight of these treatises of Mago thus preserved by the Romans.

MAGO ON WORKING OXEN.

His description is a model in essentials of strength to-day. He thoroughly understood what good handling meant. The Latin writing says, "*Tactu corporis mollissimo*," and Varro acknowledges to having borrowed "a good deal from the book of Mago, which," he says, "I make my herdsmen read."

Upon buying working cattle Mago says:

The young oxen which we buy should be square in their form, large limbed, with strong, lofty, and dark-coloured horns, broad and curly fronts, rough ears, black eyes and lips, prominent and expanded nostrils, long and brawny necks, ample dewlaps, pendent nearly to the knees, a wide chest and large shoulders, roomy bellied, with well-bowed ribs, broad on the loin, with a straight, level, or even slightly depressed back, round buttocks, straight and firm legs, by no means weak in the knee, large hoofs, very long and bushy tails, the body covered with thick, short hair of a red or tawny colour, and they should be very soft handlers.

SECTION III.—COLUMELLA AND CATO.

Columella was a voluminous and practical writer on agriculture. He was a Spanish-Roman, to coin a word indicating his nativity, and occupied a Pyrenean farm. His writings on sheep have given rise to the supposition that he introduced Merino sheep into Spain. Columella, however, does not say so. An uncle of his is quoted as having improved his flock of sheep through the introduction of African rams. In his books on agriculture and domestic animals proper, poultry and bees, he excludes the sporting dog, properly enough. They are the worst enemies of the flock master; far worse than wolves. Columella advocated gentleness and fair dealing as between landlord and tenant. He was what we would call a liberal man.

Cato, on the other hand, was what the Scotch would call near. He thought ditches should be scoured, other odd jobs done, and everything made tidy on public holidays. When slaves were sick he cut down their rations. He advised that a proprie-

for should be seeking to sell rather than to buy. The bailiff must carefully look over the cattle with a view of sale. He gave sensible advice in that the bailiff should sell old work oxen and culls—both cattle and sheep—wool, hides, old carts and old implements, and anything else that could be spared. It is not to his honor that we are obliged to record that the instructions included any old and diseased slave.

The sagacity of Cato, however, was acute, and we quote him as showing that in his time stock-feeding was regarded as most profitable. Columella records him as answering to the question how a man may get rich soonest by farming, by replying: "By being a good grazier."

How next?

"By being a middling grazier."

Columella regrets that the question being put at this time the answer was: "By being a bad grazier."

MEAT PRODUCTS ALWAYS DEMANDED.

Pliny discredits Columella as to the third reply and says that Cato's inculcation was to depend upon that which gave the best returns for the labor expended, and adds that Cato thought, with many other eminent men, that meadows produced without labor. Stockmen have ever found it to be the case, and to-day food-flesh is the only commodity that has not seriously declined in price in England. In the United States its tendency has been steadily upward.

Why? The necessities of stock-breeding and feeding are more exacting than those of grain. It requires better intelligence and more accurate knowledge. Hence, the non-reading man is never a successful breeder.

SECTION IV.—A MODEL FARMER.

Pliny, the orator, advocate, senator and poet, among his other descriptive and agricultural writings thus describes a model farmer: "C. Furius Cressinus, a freedman, became the object of much ill-feeling on the part of his neighbors, in consequence of his gathering from a very small field much more produce than they could obtain from very large ones. He was accused of attracting the crops from other fields by charms. Sp. Albinus appointed a court day to hear this charge; and Cressinus, fearing that he might be found guilty, when the tribe were about to pronounce their verdict, brought his live

and dead farming stock into the forum; and he brought with him a stout wench, and Piso says she was in good case and well clad. His iron implements were exceedingly well manufactured, the spades were strong, the shares powerful, and the oxen in fine condition. Then he said, 'These, Romans, are my charms; but I cannot show you, or bring into the forum my mental labors, my vigils, nor the sweat of my brow.'"

It is by mental labor and watchfulness, fully as much as by the sweat of the brow, that the stockman reaps profit now. It is not that it is difficult, but the stock-breeder must use intelligent observation.

CHAPTER III.

THE RELATION OF STOCK TO FARM ECONOMY.

SECTION I.—IMPORTANCE OF THE ANIMAL INDUSTRY.

The value of the farms of the United States in 1880 was \$10,197,096,776. The value of farming implements and machinery was \$406,520,055. The value of all crops produced, including all the grain, hay, cotton, tobacco, sugarcane, rice and hops, was \$2,280,097,881. The value of all dairy products, including milk sold, estimating butter at twenty cents per pound, cheese at eight cents, and milk at twelve cents per gallon, was \$221,247,943. The value of the wool at thirty cents per pound was \$46,704,525. This gives us \$267,952,468, as the market value of prepared animal products of the farm.

Assuming that one-fourth of the aggregate number of cattle and one-third of sheep are yearly killed, and one-half the total of swine, this would give 8,000,000 of cattle, 12,000,000 of sheep and 24,000,000 of hogs, in round numbers, marketed each year. That this is approximately correct is proved by the fact that in 1880, 12,243,354 hogs were packed in the west, and in the whole United States, 16,357,360 head.

SECTION II.—LIVE STOCK VS. CROPS.

It is a well-known fact that live stock is steadily decreasing in numbers in the United States, in comparison to the population, and also in comparison to the amount of crops raised. It is the fact that prices of live stock and live stock products are constantly increasing, while cereal products are rather decreasing. It is a fact that meat and meat products are the only agricultural commodities that have steadily

appreciated in price in all civilized countries, or have remained steady while other products have fluctuated more or less violently, and with a steady depreciation on the whole. The reason is, in the United States the wealth of the soil and railway facilities enable crops to be cheaply raised and cheaply and promptly transported, and especially on new lands the farmer does not turn his attention toward getting animals to eat up the surplus of his farm, until overcropping has seriously reduced the yield. There are exceptions. These exceptions are among that class who read and keep themselves informed upon what is constantly coming up new in their profession. They do not disdain to profit by the experience of others, as shown in books, the true pioneers, as they are co-laborers, of the agricultural press. This reading class will in every neighborhood be found to be the most forehanded of the community.

SECTION III.—LIVE STOCK AND FARM ECONOMY.

It is evident that the end of agriculture, when only grain crops are raised, even on the richest soils, must be utter impoverishment of the soil. It has already plastered farms in large sections of the west with mortgages. Stock raising and stock feeding redeemed them. To-day in the wealthiest sections of the west the richest farmers are those who carry the most grass. The same is true in England. Notwithstanding the vast aggregate spent in commercial manures, the "sheet anchor" of British husbandry is grass and the forage crops raised for feeding stock.

COTTON AND SOUTHERN AGRICULTURE.

Cotton cultivation and other special crops have impoverished southern soils. Her more sagacious farmers are now giving attention to grasses and forage crops as largely as possible, and earnestly inquiring for those grasses and clovers that will best stand the climate. Blue grass has made such portions of Kentucky as are adapted thereto famous the world over. It is not indigenous, there, but transplanted. It is, so far, indigenous over vast areas of the west, in one or the other of the two principal species—*Poa Pratense*, the more southern variety, and *Poa Compressa*, the more northern variety—as to form the basis of pasturage, and wise are those farmers who foster it.

HOW MUCH GRASS ?

Raise as much grass as your farm will carry in

divine stock—not less than one-half of the farm. Permanent pastures on all the rougher portions of the farm and meadow and pasture, alternated with the cereal grains on the cultivated area. Indian corn is the golden crop of the west and northwest, because it will fatten stock cheaply, and when fed out on the farm is not exhausting to the soil. Stock gives employment on the farm the year round. Beef, pork and mutton are condensed products, easily transported, always cash products, and products which leave the farm in its original fertility; for crops are exhausting to the soil, just in proportion to the bulk carried to market. Flax is excessively exhausting. Why? Both seed and straw—often the roots as well—are carried away. Clover and the grasses are renovators. Is it not wise to use them early, liberally and continuously? Hence we repeat keep not less than one-half the farm in grass; two-thirds to three-quarters would be better, and none too much where a variety of stock is kept.

SECTION IV.—DIVERSIFIED STOCK BREEDING PROFITABLE.

Every farmer must decide for himself how much and what kind of stock he will carry. The amount will depend upon the situation of the farm, the nature of the soil, climate, water facilities and other contingencies that must be studied. It must be remembered that certain grasses are eaten and others refused by a given family of animals. Cattle should have flush pastures; horses like short pastures; clover and the legumes are favorite foods for swine; sheep eat a large number of weeds, as do horses, but like horses, prefer a rather short pasture of diversified grasses. Hence diversified stock breeding is not only possible but profitable on the average farm.

WHAT TO RAISE.

Two or three colts a year, the produce of the regular milking herd, a small flock of sheep, and a few good breeding sows will year by year grow into a mine of wealth, by consuming on the farm the corn and oats raised, and the light and unsalable grain of other crops. Grass and hay are the standard food for growing animals. It is not all-sufficient. The young animal must have grain in winter to reach the best, and, of course, the most practically economical results. The fattening animals should have rations of grain daily, even in summer. With hogs clover and grass is only available to assist summer growth.

THE OUTCOME.

Your growing horse stock will give employment through the training of them and assist in working the farm. In fact, nearly all the farm labor may thus be done. When thoroughly trained, and of proper age, they may be sold to be replaced with others. This gives you money either after the spring plowing is over, or the harvest gathered, as the case may be. Your wool and lambs bring money at a time when it is always wanted. Your hogs may be finished off by Christmas, and in the early spring your steers will be ripe for the butcher. You have not depended entirely upon your cereal crops, you have not depended upon one kind of stock. You do not get your money all at one time, but right along. It is not a feast in good years, and a famine in poor years, for you have not depended upon one crop, but many. There may be partial failures every year. Yet you come out all right, for a failure in one direction generally brings compensation in another. It is the man who depends upon special crops to whom a bad season brings disaster.

SECTION V.—GRASS AND STOCK FEEDING.

Much has been written on the permanent pastures of Great Britain, and the theorist always lays great stress upon the great value of permanent pasture. It is a good thing to have upon such portions of the farm that will not profitably produce anything else. Great Britain is peculiarly situated—a moist climate, cool in summer and comparatively mild in winter. We have hot, often dry summers, and cold, often dry winters. Hence our system of cultivation and our management must be entirely different. England has many grasses adapted to her climate; we have comparatively few. Our pastures brown in summer. We must tide over our summer drouths with some fodder crop, or with grain. The stock cattle may be carried comparatively easy. The dairy stock and the fattening stock must be kept up to their full condition.

The wise farmer will carefully consider all these points. It is the season for pushing forward the hogs that are to be fattened later. As the grass fails, the steers that are to be finished later must be kept fully growing. The ewes giving milk must be looked after and assisted with some special food. Grass must be used to its fullest extent, and a moist meadow, not fully pastured, may be reserved to assist in this contingency. In other words, it is a

good plan to have some surplus grass. In flush seasons you may have surplus hay, it is true. It is always good property. Steers or sheep may be brought to eat it. The steers may be sold in the spring as stockers, and the sheep disposed of after shearing, if not wanted on the farm.

SECTION VI.—RAISING A HERD.

Whatever the stock, the best is the cheapest, always. The farmer, as well as the special stock breeder, must know what he is breeding for. For dairy purposes he would not select Hereford, Polled-Angus or Short-horns, unless he might be so fortunate as to find lineal descendants of these latter, of families once celebrated for milk, in this admirable beef breed. They are not so common now as good milkers of the mixed stock of the country. If his idea be cheese making he would not select Jerseys, however valuable they may be in a butter dairy. He must look to the Ayrshires or the Holstein or Dutch-Friesian, as this admirable milking family is indifferently called. In the west the name Holstein is generally used. Large messes of milk, rich in both butter and cheese, lie in the Dutch cattle and the Ayrshire. My own conviction is that, as a whole, the Dutch cattle are better suited to our northern climate than the Ayrshire, and as a rule they are more uniformly large milkers.

SELECTING A BULL.

Whatever breed is selected, fully as much care should be taken that the bull be of an approved milking strain, and with a record showing this, as that the cows be so. If a grade herd is to be raised, it is none the less necessary. If butter is the object, the Jersey or the Guernsey have no superiors. Whatever the object, whether for beef or milk, the bull is important, for it is he who stamps the herd with excellence.

The Devons and Galloways for their hardiness have claims in special locations. They are fair milkers, but, except the stock must take rough usage, are hardly to be recommended. If beef is the object, the Herefords will certainly give satisfaction as grazers, or as feeding cattle, well north, as will the Short-horns as certainly in the latitude of forty degrees and south. In the hill country of the south, the Jersey for butter and the Ayrshire for cheese will leave little to be desired.

HORSE STOCK.

In horses the farmer must raise that class which

will do his own work, and yet make salable horses when fully matured. The Percheron, the Clydesdale, or the Shire horse will produce colts on fair-sized roomy mares that will be active and strong, and bring handsome prices for heavy city teaming when ready for sale. The Cleveland bay will bring elegant, active horses, of good size for any farm work, and sell for good prices for express and other general work, and the handsomer specimens will sell for large prices as carriage teams.

On farms where the labor is not of a heavy nature a lighter class of horses may be bred—horses of from 1,000 to 1,200 pounds each. These are produced by breeding staunch—not necessarily very fast-trotting—sires upon fair-sized, handsome, active mares. Three of this progeny harnessed abreast will do fairly heavy plowing, and two will do the ordinary work of the farm. When mature and well trained they will sell for business—light express and buggy—horses. The better ones for road—special driving—horses, and where they can be matched together, and have a fair turn of speed, for light double driving horses.

SHEEP AND SWINE.

The same rule will apply to sheep and swine. The sire must impress the progeny. If you desire to breed mutton and wool, Shropshire, Hampshire or Southdown sires will be indicated. If length of staple and heavier weights are desired, the Cotswold has proved well adapted to our climate. The Leicester or Lincoln cross will also prove valuable. But whatever the cross adopted, once established, it should be adhered to, and the cross should be made preferably on large roomy ewes. The Downs all cross kindly upon our native fine wools, that is, sheep containing more or less Merino blood.

With swine the problem is simple. Select smooth, well developed sows, and use boars, either Berkshire, Poland-China or Duroc-Jersey, as the fancy or experience may dictate. Crosses of these three favorite breeds comprise the bulk of all hogs slaughtered in the west.

CHAPTER IV.

STOCK BREEDING ON AVERAGE FARMS.

SECTION I.—HORSE BREEDING ON SMALL FARMS.

Many farmers who raise one or two colts each year are at a loss to understand why they cannot

raise fast running and trotting horses. The reason is simple. Very fast horses are the produce of sires and mares, both bred for generations for these particular purposes, and in one special line. The average cross-roads racer or trotter has filled the country with weeds, worthless for the turf and not of value for labor. There are exceptions, it is true—very rare ones. In fact, a man is more apt to be struck by lightning than to become the possessor of a "fast one" that was "got by chance."

If you have an exceptionally good mare, proved as the mother of colts carrying the characteristics of the sire to which she is bred, take her to the best sire your means will afford. As a rule stick to the line we have marked out in the previous chapter. It has both sense and experience to back it up. The average farmer certainly cannot afford to make experiments that time and again have been proved worthless ones. The line we have indicated is the result not only of our personal observation and experience, but also as indicated by every competent authority we have ever examined.

Horse breeding by the general farmer is not to be made a special occupation. His reliance must be in feeding his provender to cattle, swine and sheep. If the farmer gets profit out of his horses raised, by their labor until ready for sale, it is so much clear gain. If he rear more than this, they lose money for him.

SECTION II.—ECONOMY OF CATTLE.

Cows are paying all the time. Their milk may be set for cream and made into butter, and the skimmed milk and buttermilk, with the addition of some special food, will rear the calves. These are constantly growing in value. Cattle consume the rough provender of the farm. They do not require extra stable care and grooming except when being fattened for the butcher. They simply require warm sheds, protected from the wind, with plenty of straw for bedding. If fed liberally from birth, so they may grow without check, they will bring at three years of age nearly that of the average unbroken three year old colt. There is a good profit on the food eaten and the manure is clear gain.

SECTION III.—SWINE ON THE FARM.

Swine are not economically kept unless they get a part, at least, of their summer feeding from red clover and weeds. When they do not form an important part of the farm economy, the clover may

be cut and thrown to them in the feeding yard, together with such weeds as may easily be gathered. Amaranth and pursley are the two common weeds especially preferred, but clover must be the main stay for succulent summer food.

If swine feeding is a special part of the farming, a pasture must be set apart for them. Let this be seeded to red clover—the biennial variety. It may be fed the first season of sowing, if well set, say after the middle of June, but it is better to cut the first crop and feed it in yards, and not pasture until the second growth comes on. The second year it may be pastured close, but the tendons of the swines' noses must be severed to prevent them from rooting, or they must have rings in their noses. The third season, the hogs may be allowed to root, unless the hog pasture has re-seeded itself. We prefer the third season to allow the hogs to root, and then to break up, keeping the clover pasture good by seeding new land.

SWINE AND THE WHITE GRUB.

Swine are indefatigable hunters of grubs and other larva, and a meadow infested with the white grub (larva of the May beetle) should be given over to the hogs to clean. These grubs live in the soil three years. The second year in the ground is their most destructive year. The third year they transform into the May or blind beetle.

The beetles may be destroyed by setting gasoline or kerosene torches in the field at night, the beetles always flying into a light and destroying themselves. We have seen a meadow so infested with the white grub, which lives on the roots of grass, that it could be rolled up like a carpet.

SECTION IV.—PLACE OF SHEEP ON THE FARM.

If sheep were simply valuable for their wool, or for their mutton, they would perhaps be the least valuable of farm animals, except in mountain or other firm soils, where they may run in immense droves, attended only by the shepherd and his dog. There is, however, the yearly shearing of wool, and also the value of the sheep for mutton when mature, and the surplus fat lambs, the most costly meat in our markets, and also their manure equally distributed. These together is what has caused the sheep's foot to be called golden.

SHEEP AS WEED DESTROYERS.

One special advantage of sheep, however, is that they are great weed destroyers—herbs being their

favorite food. Hence they have a fourfold use on the farm. They give mutton, wool, fertility to the soil, and lighten the labor of cultivation by destroying weeds. They will soon clear a corn field, after it has been "laid by," of such weeds as have escaped the cultivator, and without injury to the crop. The ears they cannot manage, and the few blades taken do no injury. If an occasional rogue butt down the corn, or tear off the ears, he must be watched out and separated. We have seen a potato field completely cleared of weeds, after the crop was too far advanced to plow, the sheep advancing between the vines without injury to the potatoes.

SECTION V.—WHAT SHEEP TO KEEP.

One must know the sheep best adapted to his location, and this aside from the question of nearness to a good market for mutton. If mutton is the special value, the Shropshire or the Hampshire-Down, as the case may be, may be used for level or rolling rich soil, and the Southdown for more hilly situations. Merinos are the sheep for all situations, though their natural place is in hill and mountain regions, or on high plateaus like our plains region. In England they share the mountain range with the Southdown, Cheviot and other Alpine breeds. The Shropshires and Hampshire-Downs take their natural place in the less hilly regions. The uplands foster the Oxfords and Cotswolds, while the Leicester and Lincoln are at home on the lowlands, nearer the sea level. A modification of this will suit the wants of the American farmer, for we have comparatively a small area occupied with mountain ranges, compared to our vast cultivatable area.

A sheep run must be rich in vegetation. It should not be marshy, and a firm soil meets the best requirements. The Leicester and Lincoln do not object to moisture, if they may lie, when at rest, on firm soil. The Oxfords and Cotswolds are at home on our rich rolling soils. So is the Merino, fairly well, and even the Shropshire. The Hampshire and the Southdown remain healthy with ordinary care, and the crosses of these breeds with the Merino do better still.

CHAPTER V.

STOCK FEEDING AND FERTILITY.

SECTION I.—WHY STOCK CONSERVES FERTILITY.

Constantly carrying away the products of the farm will in the course of years so deplete the soil,

that it will no longer pay the expense of cultivation. This is not altogether due to the exhaustion of the elements, but to the fact that nature cannot elaborate as fast as the fertility is abstracted. Constant working of the soil causes it to change its structure, and especially so in clays when wet. It is the perfect disintegrability of the soil, as one of its characteristics, that allows chemical change to go on constantly. Large quantities of manure must be applied. This is costly, and especially so where this manure must be bought. Resort is first had to plowing under green crops. This means rest and recuperation. Then summer fallowing is resorted to. This means a still more absolute rest. Then commercial fertilizers are bought. With all this the original fertility is not restored, and with the constant outlay for manure, and the labor expended in fallowing, the farmer soon finds that the value of the crops is not equal to the outlay and wear and tear. These are the facts. It is not necessary to state just how this comes about. It would require too much space. Every reflecting farmer will see the truth of the proposition.

SECTION II.—HOW STOCK INCREASES THE FERTILITY OF THE SOIL.

Good land should produce two tons at least of hay per acre. This will produce about 250 pounds of beef, if fed as grass. An acre of corn is about forty bushels, as a good average. The general average is not more than seventeen bushels. Forty bushels of corn fed to a steer, or to hogs, will make from 300 to 400 pounds of flesh, according to the economy of feeding. Everything else of the crop is returned to the soil, and if care is taken more than half of the manure is distributed by the animals themselves. Land laid down to grass is gradually brought to that mechanical condition of friability best adapted to crops.

WHY SWARD LAND IS FERTILE.

Every farmer knows that sward land is always fertile, until through constant working its integrity is destroyed. The roots of grasses, and especially of clover, are constantly bringing fertility from the depth of the soil; that portion not needed by the crop is returned again to the soil. The roots dying, leave the soil porous for the free circulation of the air, and this is constantly working change. Earthworms and other boring insects are constantly at work disintegrating and changing the mechanical

condition of the soil, and for the better. Chemical agencies, through the action of the oxygen of the air, water and heat, render the mineral constituents of the soil available, because from being insoluble they become soluble, for only in this state are they capable of being taken up by the circulation of plants. The roots of the grasses and clovers and the droppings of the animals decay into humus, and this under the action of heat and moisture assists in the development of the nitrates, the most costly of all manurial substances. Thus the farmer will see from a few of the means indicated how simple is the question of fertility, once he uses the proper means.

LIVE STOCK AND FERTILITY.

Through the live stock of the farm, it may be increased, while at the same time he is accumulating money from the profits of the sale. Let us put it in another way: A crop of wheat sold, of twenty bushels, carries from the acre 1,200 pounds yearly. It is worth in all countries distant from the ultimate market less money than the 800 pounds of flesh per acre. The flesh is seventy-five per cent water. Less than eighty pounds of dry substance has really been carried away from the soil per year per acre in the shape of meat. Why follow the argument further? It is not strange that the stockmen gradually buy up the farms of their more inconsiderate neighbors, who think there is no money in feeding stock.

SECTION III.—DIVERSIFIED AGRICULTURE POSSIBLE ON STOCK FARMS.

There is no difficulty in keeping up a diversified agriculture upon the land cultivated in annual crops in connection with stock raising. In fact, it is the only possible means by which a variety of crops can be raised on a farm, except through the interposition of costly commercial manures—nowhere possible, except near large cities with extensive local markets for special crops. Stock, however, saves elaborate rotation, expensive fallowing, costly special fertilizers and enables the cultivator to introduce the cultivation of just such crops as sell best in his local market. Thus he realizes not only the best price for his marketable products, but gets large profits upon his live stock that has made these other valuable crops possible.

SECTION IV.—RELATION OF CROPS TO STOCK BREEDING.

The relation of crops to stock breeding is worthy

of study, and for this reason. That is: The outcome of profit is founded upon the mutual and economical relation which all departments of any business bear one to another. The basis of wealth in all agriculture is justly acknowledged to be grass. Grass cannot be raised economically without something to eat it. To successfully compete in the great markets of the world, the stock breeder and feeder must, in connection with grass, also raise largely of such crops as will make stock ripe (fully fat). Here, again, as in the case of grass, only a certain portion of the grain fed is sold away from the farm. The rest goes to refertilize. In seeding land to clover the first crop may be fed, and a seed crop taken afterward if desired. In seeding a meadow, one seed crop may be taken and the aftermath fed. This will cause the meadow to be fully seeded in the weak places. The balance of the farm may be cultivated to the cereal grains or special crops that bring the most money.

COMMON SENSE ROTATION.

The rotation becomes exceedingly simple. The pasture land is made permanent on the least valuable portions of the farm, for meadow and cultivated crops. The meadows are turned over successively as required, and special forage crops are raised to supply deficiency, in particular years, or to tide over the annual seasons of heat and drouth. All these problems, simple as they are, every farmer must solve for himself, because the special necessities must be specially met.

SECTION V.—NAKED FALLOW NOT NECESSARY.

Naked fallows are the necessity of shiftless farming. They show that a farm is not carefully managed. Their only possible use is to admit the action of the air, in the loose plowed land, to exercise its disintegrating influences. Any land resting should carry a crop either to be fed off or turned under.

Here is where the stockman again has a large advantage. He raises such crops as he can feed off; gets pay from his recuperating soil, under grass, since the stock return about one-half of the constituents of what they eat immediately to the soil. The relation of crops to stock breeding, therefore, must be those that will return the best profit when sold entire, or which may be most economically fed to the farm animals, whatever they may be.

SECTION VI.—FALLOW CROPS AND LIVE STOCK.

Indian corn is the great fallow crop of the west. In fact, it is the great fallow crop of the United States, since in American agriculture a fallow crop is simply a cleaning crop. In the agriculture of the last quarter of a century, with improvements in the cleaning of crops by the use of the straddle-row cultivators, naked fallows have ceased to be known, except in a few sections, and these largely devoted to that exhausting and depleting crop, wheat after wheat.

CROPS FOR TURNING UNDER.

Next to Indian corn come clover and buckwheat for turning under, and no meadow or pasture should be turned by the plow until the growth has fully covered the ground, since it not only adds immediate fertility, but assists largely by decay in decomposing the sward. This fact is so well known in subduing prairie sod that plowing is never undertaken until the grass is at least six inches high. Breaking is then pressed forward until the grass is fully grown. Next in importance in fallow crops, which serve the double purpose of cleaning the soil, and furnishing feeding to stock, are root crops. In some northern sections and in Canada peas are largely used, since they may be drilled and cultivated until they get strength to quickly cover the soil. In the south the cow pea, so-called, but which is really a bean, is largely used. Root crops, however, come next to Indian corn. Improved implements of cultivation render the labor comparatively light, and their great value as succulent winter food is yearly increasing the area sown. The American climate is not adapted to the growth of white turnips, nor indeed to ruta-bagas, except well north. Carrots, however, are grown everywhere, but mangel-wurzel beets, from their ease of cultivation, facility with which they may be harvested, and their enormous production, are yearly becoming more and more popular, especially on prairie soils.

CHAPTER VI.

GRASS AND HAY CROPS.

SECTION I.—WHAT IS GRASS?

The question of grasses is the most important in agriculture, since it is the basis of all successful agriculture. It becomes especially important to all who make live stock a special field of labor. Grass is the universal natural covering of all arable soils,

or those rich enough for profitable cultivation. Hence the adage that a grass country is a good farming country. Grass is known everywhere by its peculiarity of leaf and stem. All the cereal grains, Indian corn, sorghum, sugar cane, millet, etc., belong to the great grass family. Clover, alfalfa and all that class of legumes are not grasses, though usually termed so by farmers. Thus defined, in this chapter, I will not depart from this classification, although incorrect, since they will only be considered as forming an important portion of meadow and pasture forage. Grass is the most valuable single crop cultivated in the United States, even in its dried form of hay.

THE VALUE OF GRASS.

The value of grass as pasture is fully double that of hay. More than half of the whole vegetation of the earth is grass, and to man its value is more than that of all other edible plants combined. That we have a large stock to select from is shown by the fact that Prof. Beal, of the Michigan Agricultural College, names sixty-five true grasses, excluding the cereal grains and the clovers, as being found in Michigan, the most of them indigenous to the state. Prof. Lapham notes 105 grasses as native to Illinois, eleven introduced and twelve known as cultivated grasses. The west and south are rich in leguminous plants, including several valuable species, and a number of varieties. The list to select from is really ample, and only requires some study as to the availability of varieties to soils and climate, to enable the stock raiser to select the best.

SECTION II.—MEADOW AND PASTURE GRASSES.

The stock breeder must carefully discriminate between meadow and pasture grasses. There are grasses, including clovers, that are valuable for both. A meadow is intended to be cut over for the hay it produces. Feeding off the aftermath does not make it a pasture and, especially when the body of the grass is timothy, this feeding down is more often a loss than a profit. It is in such cases as this that the individual must decide as to the propriety of feeding off a meadow. There are plenty of cases where it is admissible. If the aftermath is flush, timothy may be fed by cattle. It should never be fed close, especially by sheep and horses. They generally destroy the bulb—the life of the grass—which is annually formed next the surface of the earth.

ABOUT MEADOWS.

In meadows the idea is to produce the heaviest swath of such nutritious grasses as will ripen nearly together. Clover should form an important part of all meadow grasses—the red clover for dry arable soils, and alsike clover for moist soils. Wherever it will winter, alfalfa is one of the most valuable of the clovers, especially south and on the milder portion of the plains region.

GOOD MEADOW GRASSES.

In the middle region and northern states, Kentucky blue grass, fowl meadow, June grass (*Poa compressa*), orchard grass, smooth-stalked meadow grass, red top, tall fescue, timothy, red clover and alsike clover are among the more valuable and generally used of grasses and clovers. South, cow-peas are largely sown for hay. Alfalfa, red clover, Bermuda, crab, crow foot and gamma grass are largely used in the gulf states. In the middle southern states, where these true grasses will not winter, blue grass, orchard grass, timothy and red top do fairly in connection with red clover.

SECTION III.—RIPENING OF GRASSES.

Blue grass, orchard grass, tall fescue and red clover ripen nearly together. Timothy ripens later, and red top and fowl meadow later still. It may be stated as follows: Where Kentucky blue grass ripens in June, the later grasses, will ripen as follows: Timothy in July, and fowl meadow and red top somewhat later, in July and August. Timothy, red top and fowl meadow ripen, it will be seen, nearly together. Other grasses, less known, ripening nearly with timothy are tall fescue, fertile meadow grass, yellow oat grass, meadow barley grass and soft meadow grass.

SOIL AND GRASSES.

For our dryer meadow lands, in connection with the red clovers, we must depend principally upon timothy, orchard grass, meadow foxtail and ryegrass. For moist meadows, in connection with alsike clover, one may use red top in its varieties, fiorin, fowl meadow, fescue and meadow foxtail. All these grasses and clovers are valuable for pasturage, as well, except timothy, which will not stand close cropping. The three most valuable for meadow and pasture are blue grass, orchard grass and red top.

SECTION IV.—LISTS OF GRASSES FOR SPECIAL USE.

The following table will be found valuable as

showing pounds in a bushel, average number of seeds in an ounce, depth of sowing and per cent of loss in weight in drying into hay, as given in "Grasses, Cereals and Forage Plants."

NAMES OF GRASSES.	Average number of pounds in a bushel.	Average number of seeds in an ounce.	Depth of soil in inches and fractions of an inch at which sowing will germinate.	Depth of soil in inches and fractions of an inch at which sowing will germinate.	Depth of soil in inches and fractions of an inch at which sowing will germinate.	Depth of soil in inches and fractions of an inch at which sowing will germinate.	Percentage of loss in weight when dry, cut in time of blossoming.
White Top.....	13	300,000	to 1	to 1	to 1	to 1	.65
Red Top.....	12	425,000	to 1	to 1	to 1	to 1	.61
Tufted Hair Grass.....	11	132,000	to 1	to 1	to 1	to 1	.65
Meadow Foxtail.....	5	70,000	to 1	to 1	to 1	to 1	.57
Sweet-scented Vernal	6	71,000	to 1	to 1	to 1	to 1	.57
Tall Oat Grass.....	7	21,000	to 1	to 1	to 1	to 1	.15
Sweet-wheat Grass.....	10	15,000	to 1	to 1	to 1	to 1	
Crested Dog's Tail.....	20	28,000	to 1	to 1	to 1	to 1	
Orchard Grass.....	12	40,000	to 1	to 1	to 1	to 1	.20
Hard Fescue.....	10	30,000	to 1	to 1	to 1	to 1	
Tall Fescue.....	14	20,000	to 1	to 1	to 1	to 1	.52
Sheep's Fescue.....	14	61,000	to 1	to 1	to 1	to 1	.65
Meadow Fescue.....	14	20,000	to 1	to 1	to 1	to 1	.65
Sweet-spike Fescue.....	15	21,700	to 1	to 1	to 1	to 1	.60
Red Fescue.....	10	30,000	to 1	to 1	to 1	to 1	
Red Meadow Grass.....	13	58,000	to 1	to 1	to 1	to 1	.30
Common Mannagrass.....	15	33,000	to 1	to 1	to 1	to 1	.35
Meadow Soft Grass.....	17	27,000	to 1	to 1	to 1	to 1	.73
Italian Rye Grass.....	17	27,000	to 1	to 1	to 1	to 1	.31
Perennial Rye Grass.....	18 to 30	15,000	to 1	to 1	to 1	to 1	.31
Wheat Grass.....	25	80,000	to 1	to 1	to 1	to 1	.50
Red Canary Grass.....	48	12,000	to 1	to 1	to 1	to 1	.38
Timothy.....	41	24,000	to 1	to 1	to 1	to 1	.32
Wood Meadow Grass.....	15	173,000	to 1	to 1	to 1	to 1	.50
Blue Grass.....	13	213,000	to 1	to 1	to 1	to 1	.51
Rough Stalk Meadow.....	15	127,000	to 1	to 1	to 1	to 1	.57
Beach Grass.....	15	104,000	to 1	to 1	to 1	to 1	.72
Yellow Oat Grass.....	5 to 15	118,000	to 1	to 1	to 1	to 1	
Red Clover.....	41	16,000	to 1	to 1	to 1	to 1	
Perennial Clover.....	41	16,000	to 1	to 1	to 1	to 1	
White Clover.....	65	32,000	to 1	to 1	to 1	to 1	
Lucerne.....	60	12,000	to 1	to 1	to 1	to 1	
Sainfoin.....	20	10,200	to 1	to 1	to 1	to 1	

NEEDING TO GRASS.

In sowing grass for pasture, always sow thick, not less than thirty-two pounds of any mixture, and forty is better. For meadow the same advice is good, but so heavy seeding is not required; yet not less than twenty pounds should be sown per acre, and twenty-five would be nearer the mark. If the mixture be timothy and clover, twelve pounds of timothy and eight pounds of clover per acre will be about the right proportion.

SECTION V.—MIXED GRASSES FOR VARIOUS SOILS.

Our lists of grasses for meadow and pasture are many, mostly having been taken from English sources, and containing many varieties not adapted to our dry climate. Upon a careful review of the whole subject, some time since, I prepared the following tables of quantities of grass seed to be sown, for *The Breeder's Gazette*, for three different classes

of lands, both for permanent pasture, and hay and pasture, introducing some varieties not generally used, and for the reason that the greater the number of varieties the more uniform the stand and the heavier average burthen of grass. A variety not adapted to a meadow or pasture, as a whole, may nevertheless be adapted to certain portions of a meadow or pasture. Here they will catch and spread, thus insuring against thin spots in the meadow or pasture. It will be seen that fewer varieties are given in each case for hay than for pasture. Below is the list for good meadow soils—arable loams to rather strong clay soils—giving seven varieties for hay and eleven for hay and pasture.

LIST FOR GOOD MEADOW SOILS.

	SEED FOR HAY (pounds).	HAY AND PASTURE (pounds).
Timothy.....	12	1
Red Clover (perennial).....	8	1
Orchard Grass.....	0	1
Meadow Fescue.....	0	1
Meadow Foxtail.....	0	1
Blue Grass.....	0	1
Red Top.....	0	1
Rye Grass.....	0	1
Fowl Meadow.....	1	1
White Clover.....	1	1
Total pounds per acre.....	37	18

The grasses well adapted to loams are the fescue grasses, nearly all of the *poa*, or blue grass tribe, the most of the bent or red top (*Ligustis*) species, and the rye grasses (*Lolium*).

The following table of varieties will be found adapted to lands subject to occasional overflow:

LIST FOR LANDS SUBJECT TO OCCASIONAL OVERFLOW.

	SEED FOR HAY (pounds).	HAY AND PASTURE (pounds).
Fowl Meadow.....	4	1
Alsike.....	1	1
Tall Fescue.....	1	1
Rough-stalked Meadow.....	5	5
Blue Grass.....	1	1
Red Top.....	1	1
Timothy.....	1	1
Florat.....	5	5
Meadow Soft.....	0	0
Perennial Clover.....	0	0
White Clover.....	0	0
Total pounds per acre.....	36	40

Grasses adapted to moist soils, in addition to those previously named, are: Sweet-scented soft grass, spiked fescue grass, red meadow grass, narrow-leaved creeping bent.

The grasses adapted to sandy loams and other dry (not arid) soils will be found below:

LIST FOR SANDY LOAMS AND OTHER DRY SOILS.

	SEED FOR HAY (pounds).	HAY AND PASTURE (pounds).
Blue Grass.....	0	5
Red Clover.....	6	6
Sheep's Fescue.....	4	4
Purple Fescue.....	4	4
Orchard Grass.....	6	6
Tall-oat Grass.....	6	6
Hard Fescue.....	4	4
Rough-stalked Meadow Grass.....	4	4
Crested Dog's Tail.....	12	12
Red Top.....	0	4
Total pounds per acre.....	32	45

SECTION VI.—ECONOMY OF THICK SEEDING.

To show the economy of thick seeding we give a table as actually counted by the English authority, Sinclair. It shows the average number of plants to the square foot of sward, as counted, showing conclusively that seed enough must be given to meet every requirement of the soil. It also shows the great impulse, even in moist England, arising from the irrigation of meadows:

CHARACTER OF THE TURF.

	WHOLE NUMBER OF PLANTS ON THE SQUARE FOOT.	NATURAL GRASSES.	CLOVER AND OTHER PLANTS DISTINCT SPECIES.
1. A square foot taken from the richest natural pasture capable of fattening one large ox or three sheep to the acre was found to contain.....	1000	940	60
2. Rich old pasture capable of fattening one large ox and three sheep per acre.....	1000	1032	58
3. Another old pasture contained.....	910	880	30, 12
4. An old pasture of a damp, moist and mossy surface.....	634	510	124, 8
5. A good pasture, two years old, laid down to rye grass and white clover.....	470	452	18
6. A sod of narrow-leaved meadow grass (<i>Poa angustifolia</i>) six years old.....	102		1
7. A sod of meadow foxtail by itself six years old.....	80		1
8. Rye grass by itself six years old.....	70		1
9. Meadow irrigated and carefully managed.....	1798	1702	96

SECTION VII.—A REFERENCE TO VALUABLE TABLES.

It will be unnecessary to follow the matter farther here. To make the matter complete, however, we give in the appendix, among the valuable tables, a complete list for various soils, for reference, as adapted by Prof. Killebrew from the work of Mr. Flint. They were made for Tennessee, but will be found all right for the west generally. No. 12 is only adapted to the latitude of Tennessee and south. We also give there a table of the more valuable grasses, as taken from the celebrated Woburn tables, carefully prepared from Sinclair. (See Appendix.)

SECTION VIII.—MANAGEMENT OF GRASS LANDS.

To state the case generally, the value of a pasture lies in its capability for furnishing grazing from early spring until late in the autumn. To reach the best results in this direction has been the study of the most acute farmers of England for the last fifty years. The success has only been measurable even in that cool, moist climate, one of the best for grass in the world. Even there the greatest success has only been attained by means of irrigation during certain seasons. In the United States, with our cold winters and hot, dry summers, the difficulty is intensified; and our best feeders, especially dairy-men, have found themselves obliged to fall back upon special crops—corn, sorghum, alfalfa—where it will stand—and various other soiling crops, to be cut green, to tide over the drouths and heat of July and August. That plants will ever be found adapted to grazing that will produce succulent food during the hot, dry months of summer is hardly to be expected; hence we must be content with those plants that give an abundance early and late, falling back upon forage crops and the grain of Indian corn, which, fortunately, can be raised so cheaply in the west and which will compensate for the lack of moisture that has made the meadows and pastures of Great Britain the theme of poets the world over.

On calcareous soils blue grass must constitute the ground work of pasturage; and upon our common prairie soils clover must be the sheet anchor.

EXPERIMENT THE BASIS OF SUCCESS.

Experiment alone can determine the exact value of the various grasses adapted to the various soils and locations. The bent grasses (*Agrostis*) will undoubtedly be found among the more valuable. Orchard grass is undoubtedly the most promising of these not in general use. The rye grasses must not be overlooked. Fox tail is worthy of extended trial. Good may, perhaps, be found in some of the panic grasses. The broad-leaved variety bears close grazing; but exists only here and there, never in a close sod. The fescue grasses, many of them, have the same habit, particularly sheep's fescue; their value is undoubted. It must be remembered that in pastures this habit of growing in tufts, or separable here and there, is not particularly objectionable, since pastures should be made up of a large variety of grasses; the more the better.

The object of thick seeding has already been gen-

crally stated. One object in increasing varieties is to insure a full, compact sward. Another object is, that one variety follows another in season, thus insuring continued grazing. Still another object is that if particular varieties are not adapted to the soil there will be still enough remaining that are so adapted, after the natural selection by climate and soil has been made.

Mr. John Stanton Gould, some years since in an address before the Agricultural Society of Maine, sums up the whole matter, which we condense as follows:

First. It appears that the grasses, which in the present state of our knowledge are the most useful and the most profitable, seem to flourish best when the opposite extremes of wetness and dryness are avoided. Very careful counting in a great number of meadows, gives the following results: In wet meadows, out of thirty plants, four were useful and twenty-six were useless; that is, they were weeds. In dry meadows, out of thirty-eight plants, eight were useful and thirty were useless. In moist meadows, out of forty-two plants, seventeen were useful and twenty-five useless.

Second. In a rough classification of soils into upland thin soils, poor clay, rich loams, flooded meadows, and irrigated meadows, the following figures, which give the average of a great number of careful observations, will show the relative values of each kind of soil. The "upland thin soils" were in all cases the poorest grass lands; the "poor clays" gave fifty per cent; the red loams 150 per cent; the "flooded meadows" 250 per cent, and the "irrigated meadows" 400 per cent more than the "upland thin soils."

Third. The soil which seems best adapted to the production of our best grasses is a strong, deep calcareous soil resting on a clayey subsoil. On such a soil we may be sure of an abundant vegetation resisting drought and heat and making a fine, desirable sod; but you must not forget that there is no soil which is incapable of bearing grass if we only select the variety best adapted to it, and bestow upon it the treatment most suitable to it. By effecting physical and chemical alterations in the soil, we may adapt it to the production of almost any kind of grass; but as this is an extensive and tedious process, most farmers will prefer, at least in the first instance, to suit their grasses to their soils, rather

than the soils to the grasses, but we should keep the amelioration of the soil steadily in view so as at length to fit it for the production of the most valuable kinds.

ABILITY OF SOILS TO NOURISH PLANTS.

Mr. Gould states that if soil is prepared thoroughly and made as rich as manure can make it, and sown so thickly with any one kind of grass seed that the seeds will actually touch each other, it will be found that after germination many of the young plants die out, leaving certain interspaces of unoccupied soil between the plants that still live. These interspaces may be filled ever so often with fresh seed, but a like result is sure to follow. It is impossible to fill them with the same species, as the living plants will not tolerate any neighbors nearer than a fixed distance—a distance determined by the greater or less abundance of the specific food required by the particular species of grass cultivated.

If with a given amount of this food, the plants will grow within three inches of each other, as the amount decreases they will require intervals of six, nine, twelve inches, and so on. Each soil has therefore a capacity for bearing a maximum number of plants of one variety of grass, which can under no circumstances be exceeded. If, then, these unavoidable interspaces be sown with the seeds of another species of grass, a certain number of its plants will grow and the remainder will die after germination, as before; the plants that grow will not interfere with those of the first variety, and the crop will be materially increased. Still there will be spaces of unoccupied soil, and the ground will not be thoroughly turfed over until from five to twenty varieties are growing upon it.

Practical experience has clearly shown that any soil will yield a larger and more nutritive crop when sown with from five to ten species of seeds than when only one or two are growing. Animals flourish much better on mixed grasses than they do on a single species, however nutritive that species may be. The animal tissues require numerous elements for their support, and these elements are furnished in greater abundance, and are better adapted for assimilation by a mixture of dissimilar grasses. Nature teaches this doctrine very clearly, independently of theoretical considerations. The horse, when at liberty to choose, will always leave the single one for the mixture.

RICH VS. POOR SOILS.

In the tables we find that on a very rich old pasture, which fattened one large ox and three sheep per acre, one thousand plants stood on one square foot of ground, of which nine hundred and forty were natural grasses, and sixty were creeping rooted clover and other plants; there were twenty distinct species of plants on this square foot of ground.

On a well-managed water meadow there were on a square foot one thousand seven hundred and two plants of the natural grasses, and ninety-six of the clovers and other plants. Now compare this wonderful luxuriance with the produce of an equal space of land with a single species of grass. A single square foot where nothing but narrow-leaved meadow grass grew, contained one hundred and ninety-two plants; of meadow fox-tail, eighty-two plants; of rye grass, seventy-five plants. Compare seventeen hundred and ninety-eight with seventy-five plants to a square foot and we can at once see how desirable and profitable is the sowing of a great variety of seeds. You will see how much is annually lost to the country for the want of a greater variety of plants in our meadows and pastures, for the farmers in the United States who sow many varieties of grass seeds might be comfortably accommodated in a moderately-sized church.

SOWING GRASS SEEDS WITH GRAIN.

Most farmers are accustomed to sow their grass seeds with some kind of grain, and many defend the practice on principle, but really the preponderance of evidence is clearly and unequivocally on the side of those who advocate separate sowing. The practical results have almost invariably been in favor of this method when it has properly been done, and theoretical considerations would most certainly lead to this practice. The grain crop abstracts from the soil a large portion of the nutriment which is needed exclusively by the young grass. Every plant of grain occupies a place to the detriment of the expected sward; much injury is done by the lodging of the grain when bent down by heavy rains. The young plants are repressed in the spring by the shade of the grain when they most need the genial influence of the sun, and then when the grain is cut it is exposed in its weakened state to its fiercest summer glare, at a period when it is more exposed to drought than at any other season of the year. This perfect coincidence between the teachings of science and

the results of practical experience, fully justify the opinion just given, that grass seeds in most cases should be sown by themselves.

DEFECTIVE SEED.

One cause of the failure of seeds to germinate, is the damaged condition in which they are received from the seedsman. It must be borne in mind that different species of grass vary greatly in their ability to form good seed, a large proportion of the most carefully secured crops proving abortive; thus, orchard grass is very apt to prove defective, perennial red clover has frequently abortive seeds, and the seed of the meadow fox-tail is, as a general rule, so bad that only one seed out of three will germinate.

CHAPTER VII.

FORAGE AND ENSILAGE PLANTS.

SECTION I.—THE USE OF FORAGE CROPS.

To the stock breeder and feeder, and especially to the dairyman, the question of forage plants to tide over summer drouths, and the preparation of some succulent food for winter use, is of prime importance. Fattening stock cannot be kept thriving uniformly during July and August on pasturage alone, except in rare seasons when continued rains and cool weather hold the meadows and pastures flush. In dry seasons cattle often actually lose flesh, and milch cows always shrink. The want may be fairly met with rye, Indian corn, sorghum and millet, sown thick, and cut green to succeed each other, and in the order named. Where irrigation may be practiced, clover in the west, and alfalfa on the plains, will meet every requirement for soiling during drouths. Whatever the plants used, they should be fed fresh. Wilting in the sun should never be allowed. The full succulence of the plants should be retained in the green forage cut for midsummer feeding.

SECTION II.—FORAGE CROPS.

Besides those already enumerated, pearl millet contains a large leaf surface. Hungarian grass and German or golden millet and prickly comfrey, will also be found available. The first named, however, will scarcely be found profitable north of forty degrees. The latter named is propagated by division of the roots. It stands the severest drouths, is quite hardy, but really needs plenty of moisture to give its full yield, which then is enormous. These remarks will apply to all the region lying north of Tennessee.

South of that latitude, Indian corn and sorghum may be grown everywhere. The cow-pea, really a bean (*Dolichos*), is, also, generally used. Pearl millet (*Pennisetum glaucum*), seems yearly growing in favor. Brown dhoura, also called Indian millet—a sorghum—is considered valuable both for its grain and its fodder. There are none of the plants here mentioned, either for the north or south, except rye, Hungarian grass and German millet, north, and the cow-pea, south, but should be sown in drills and cultivated. Prickly comfrey may be planted three feet by two feet apart, and on rich land will completely cover the soil. It is not, however, a really valuable plant where better may be grown.

SECTION III.—ENSILAGE AND ENSILAGE PLANTS.

Were it not for the value of succulent food in winter, especially for dairy cows, there would be no economy in ensilage in the United States. It is cheaper to dry fodder than to cut it green and pack it away in air-tight pits. Ensilage is the French name applied to green fodder when so preserved. The pit in which this food is preserved is called a silo. Ensilage is not a perfect food, and so many cases of injury to horses, from feeding ensilage, have been reported, that it should be used for these animals with great care, if at all. A few carrots daily are certainly preferable. It is, however, an essential aid for cattle in winter, in connection with other food, and especially so for cows giving milk. Any green plants readily eaten by stock may be used in filling the silo.

THE SILO AND ENSILAGE.

Some would-be scientific writers have used so much mystery in their ideas of how to form a silo that many persons have been deterred from attempting the labor. The fact is, a pit dug in any compact soil free from moisture, and not less than six feet across, will keep green vegetable matter when in a proper state of division, if pressure is applied to so compress the mass as to fairly exclude the air. In the case of corn or other fodder cut just before frost, the pressure may be lighter than that cut earlier. The kind of pressure cuts no figure. Barrels of sand or any other easily obtained material will furnish this.

The material must be free from rain or dew, should be cut into lengths of two or three inches, so it may settle uniformly, and it should be well tramped while being placed in the silo. It is better

that not more than two or three days be spent in the filling. In any case strong pressure should be applied in the intervals, and from a well-known law, that the stronger the pressure the less liability to heat of moist material. It is the action of the air, or rather the oxygen of the air, upon fermentable matter that causes heating, and green vegetation piled in a body is just in the proper condition of moisture to heat strongly and quickly.

HOW TO FORM A SILO.

Any person having a bank barn in a soil through which water does not filtrate may easily make a silo. The wall may be laid up of brick or stone, or even of plank thick enough to resist the pressure of the earth. The silo should not be less than twelve feet square and deep, to save the ensilage perfectly. The upper four feet may be of boards or planks, and the whole roofed over. If built wholly in the ground, next the barn cellar, it need not be water tight unless there is danger of filtering in from the outside. Put in the cut fodder as quickly as convenient. When settled, add still more, and so on until filled. No definite rule of pressure can be given. Strong pressure, however, is better than light pressure, for reasons heretofore given. Barrels of sand closely set together over the planking covering the ensilage (and this planking must be so fitted that it will settle freely with that of the ensilage) will be sufficient. If it gets hot in the silo increase the pressure. Stone is, perhaps, easiest to handle as a means of pressure.

If the ensilage comes out in the state called wine sour—the acid fermentation—it will be right according to some good European authorities, but the less fermentation the better; and this is determined by the more or less perfect exclusion of the air. When the material is removed from the silo, it should be cut down square, and only so much taken daily as will serve for the proper ration. It will range in weight from thirty-five to forty pounds per cubic foot, which may serve for two cows daily. One cubic foot per day would be a full ration in connection with other food, and at this rate a cow would eat, at thirty-five pounds per cubic foot, over two and a half tons in five winter months.

There are some points that must be remembered in building a perfect silo. The walls should be solid, air tight, with proper drainage below. The more perfectly the air is excluded at the top the

more perfectly the ensilage will keep. The silo should be built so as to have direct access thereto from the feeding stable.

SWEET ENSILAGE.

The material when put in should be well tramped, and the silo filled if possible before very much heat is shown. Then the mass may be allowed to heat to 140 degrees, which will kill the germs of fermentation, always found in the air. Then press down firmly and you should have sweet ensilage. To ascertain the temperature drive down a pointed, hollow gas pipe that will admit a self-registering thermometer in the caliber of the pipe. When the heat is sufficient, draw the pipe and put on the weight. A given weight of ensilage in a deep silo, exposes less surface to the air than a shallow one, and requires less pressure from the top. The cost of a silo will vary from half a dollar to five dollars per ton, capacity, as between the simplest wooden structure, and one of heavy masonry with the most careful detail in the finish.

CHAPTER VIII.

THE ECONOMY OF STOCK BREEDING.

SECTION I.—WHY STOCK PAYS—CONDENSED PRODUCTS.

The economy of live stock consists especially in the fact that the farm is not constantly depleted of its fertility. In fact a farm that carries its full maximum of live stock may constantly continue to increase in fertility under a judicious system of cultivation; for, with the manure left by the animals, and the raising of only such crops as may be consumed on the farm, there is so little carried away from the soil that it is more than made good from that great reservoir of fertility, the air. The rotation becomes one of the most simple, grass, hay, fodder crops and Indian corn being the only crops raised, except only oats enough to carry the yearly necessities of the horses, colts, calves and lambs. There is no permanent pasture except upon those situations that will not admit of cultivation.

Red clover, timothy, orchard grass and red top will be the principal grasses, for hay with blue grass and white clover for all permanent pastures as the basis. Upon all soils natural thereto, blue grass will take the place of other grasses as the meadows fail in their hay crops, and orchard grass and red top will do the same upon soils not well adapted to blue grass. The rotation will prevent pastures from

becoming bound and mossy. When this begins to show, break them up and reseed.

CONDENSED PRODUCTS.

Whether you sell beef and pork, or confine your energies to dairy products, the salable ones will be condensed into small compass, and the farther you are from the consuming market, the more your relative profit will be, as between selling live stock or the grain of the farm. The beef from an acre will not only sell for more than the grain from an acre, but you will reap the benefit of the added fertility of the farm. It is plain you are not making money out of the life of the soil, but out of concentrated products, made possible by your labor. In selling the grain product alone you simply get the value of your labor, for the depletion of the farm will surely eat up, in the end, any saving you may have made whilst the land was new. This has been proved so many times that the mere statement is alone necessary.

SECTION II.—NO IDLE SEASONS WITH LIVE STOCK.

The stock feeder always has something to do. It is not a rush and hurry in summer and nothing to do in winter. The labor is fully and equitably divided, winter and summer. In fact, in the summer, except during haying, there is no especial press of work, and in winter the routine is easily managed. Then, again, there is always something to sell,—beef, pork, butter, cheese, eggs, fowls, lambs, surplus calves, and wool. These are divided over the whole year, and not as in exclusive grain farming, with the rush and hurry, with much costly hired labor in summer, the rush of crops to market after harvest, and the enforced idleness of the family and the teams in winter. Neither is the work so onerous upon the female part of the family, with its added housework contingent upon summer hired help, and the extras of a long and tedious harvest.

SECTION III.—DIVERSIFIED STOCK PRODUCTS.

Let us figure how the man owning 100 acres of land may arrange his farm to carry the greatest amount of stock and at the same time raise a diversity of crops; for the greater the number of products the less the risk of failure one year with another; if one fails we have others to fall back on. The farm may contain 100 acres of pasture and meadow, or seventy-five of pasture and twenty-five of hay. In the regular rotation this will give twenty-five acres of sward for breaking each year

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and the same amount for seeding down. Thus, in the rotation, there may be twenty-five acres of wheat and twenty-five acres of oats, or other cereal grain, each year; or fifty acres of corn and ten acres devoted to other purposes. Land in good heart, when swine and sheep form a fair proportion of the live stock, will easily carry one head of cattle or horses, or their equivalent per acre of pasture. Forty head of cattle and horses, one hundred sheep and thirty hogs may be carried as an average.

FEEDING THE CROPS.

The corn and other grain, the latter seeded with grass, will give ample scope for rotation and with the grain fed the straw may all be utilized, the best for feeding and the balance for bedding. The corn may be shocked, for feeding, with the stalks, to the fattening cattle, the stock hogs doing the gleanings. So there will be ample scope for extension in stock, since, except in light years, the produce will not be consumed; but the surplus should always be held one year to provide for untoward seasons. Ten cows will provide for the increase of stock. What is lacking to fully consume the grain pasture, and hay, may be bought of more improvident neighbors, selecting the best calves.

SECTION IV.—FEEDING AND FATTENING STOCK.

The farm should yearly turn out fifteen fat steers, two-year-old past, twenty-five fat hogs, forty sheep and lambs, and the fleeces should yearly produce 500 pounds or more of first-class wool. The steers should average 1,200 pounds, and the hogs 250 pounds each. The milk, or rather the cream, may be sold to the creamery, or made into butter at home, for, as good butter may be made with improved means of setting milk in the farm dairy as anywhere else. The eggs and fowls will cut no mean figure in the profits, and the skimmed milk and butter-milk, with some extra feed in the shape of corn meal, oat meal and linseed meal, will raise the calves nearly as well as the cows could do so themselves.

BREEDING STOCK.

The breeding sows must be carefully looked after, and if extra early pigs, say in February and March, are desired, they must have a place for farrowing with a temperature of not much under sixty degrees; for a young pig is even more susceptible to cold than a young lamb.

If a place that can be heated by fire is provided,

lambs may be yearned at any season, and fat lambs intended for the butcher are worth double in April what they are in July. So pigs born in February and March and turned off fat after the new year always pay better than if wintered once before killing.

The same rule applies to steers. That man makes the most profit who feeds from birth, keeps his cattle growing constantly until ripe for the butcher. For it is well known to the practical man that the older the animal the less the average gain from birth.

SECTION V.—AVERAGE GAINS OF FAT STEERS.

There is no more condensed way of showing this than by tables. Hence we give the results at the last fat stock show in Chicago, in 1883, showing rings of both Shorthorns and Herefords, from aged cattle down to one year old. It will be seen that the average gain from birth is on a constantly decreasing scale as the animal reaches maturity, even with the best feeding. Where cattle are allowed to lose flesh in the winter the showing would be still more marked. The tables of rings of cattle for a series of years show as follows:

SHORTHORNS.

Six rings of cattle under four years have averaged as follows:

Year.	Number of animals.	Av. age in days.	Av. weight.	Av. gain per day in lbs. since birth.
1883	Three animals averaging.....	1,344	1,055	1.46
1882	Five animals averaging.....	1,339	2,147	1.59
1881	Three animals averaging.....	1,304	2,093	1.53
1880	Four animals averaging.....	1,300	2,172	1.60
1879	Two animals averaging.....	1,326	2,039	1.53
1878	Two animals averaging.....	1,250	2,087	1.67

Comparative ages, weights and gains of animals under three years:

Year.	Number of animals.	Av. age in days.	Av. weight.	Av. gain per day in lbs. since birth.
1884	140 animals.....	871	1,765	2.02
1881	Seven animals.....	963	1,634	1.69
1880	Five animals.....	949	1,907	1.92
1879	Three animals.....	871	1,624	1.86
1878	Five animals.....	934	1,621	1.73

The averages of the ring for yearlings were:

Year.	Number of animals.	Av. age in days.	Av. weight.	Av. gain per day in lbs. since birth.
1883	Nine.....	648	1,221	1.92
1882	Three.....	480	1,288	2.72
1880	One.....	721	1,500	2.20
1878	Three.....	672	1,385	2.06

Of bullocks over four years the six rings since 1878 have resulted as follows:

Year.	Av. number of animals of rings.	Ar. age in days.	Weight.	Average.
1883 Six		2,035	1,705	0.71
1882 Eight		2,106	1,808	0.85
1881 Four		2,100	1,757	0.85
1880 Three		3,031	1,418	0.50
1879 Eight		2,364	1,780	0.81
1878 Six		2,037	1,723	0.72

HEREFORDS.

The averages of the three-year-olds (Herefords) have been as follows:

Year.	Number of animals.	Age in days.	Weight.	Ar. gain.
1883 Five		1,223	1,851	1.15
1882 One		1,121	1,703	1.57
1881 Two		1,233	1,917	1.57
1880 One		1,183	1,875	1.58
1879 Two		1,380	1,973	1.11
1878 Three		1,316	1,735	1.20

The average of the two-year-olds is shown below:

Year.	Number of animals.	Age in days.	Weight.	Ar. gain.
1883 Three		909	1,578	1.53
1882 Three		951	1,626	1.70
1881 No entries				
1880 Three		913	1,575	1.85
1879 One		930	1,374	1.57
1878 One		1,088	1,470	1.36

Hereford Yearlings show as follows:

Year.	Number of animals.	Age in days.	Weight.	Ar. gain.
1883 Seven		610	1,132	1.85
1882 One		697	1,340	1.90
1880 One		710	1,115	1.57
1879 Three		577	1,320	2.15

Average of Herefords of various mature ages.

Year.	Number of animals.	Ar. age in days.	Ar. weight.	Ar. gain.
1883 Five		1,774	1,650	0.70
1882 Two		2,880	1,072	0.65
1881 Three		1,783	1,435	0.82
1880 One		1,350	1,290	1.27
1879 Two		3,663	1,615	0.56
1878 Three		2,170	1,630	0.78

Let us now show the various two year old rings of Shorthorns and Herefords, with grade Shorthorn cows, aged. It will assist in a comparison of average gains in connection with a study of the previous tables: In 1883, twenty grade Shorthorns and nine grade Herefords; in 1882, twelve grade Short-

horns and six grade Herefords; in 1881, twenty-eight grade Shorthorns, four grade Herefords and one Hereford-Shorthorn; in 1880, sixteen grade Shorthorns and four grade Herefords; in 1879, thirty-one grade Shorthorns; in 1878, eleven grade Shorthorns and two grade Herefords.

The whole tabulated is given below:

Year.	Number of animals.	Ar. age in days.	Ar. weight.	Ar. gain per day in lbs. since birth.
1883 Twenty-nine		938	1,910	2.03
1882 Nineteen		951	1,753	1.85
1881 Thirty-three		955	1,625	1.70
1880 Twenty		901	1,721	1.80
1879 Thirty-one		934	1,710	1.77
1878 Thirteen		935	1,651	1.73

The rings of cows have always been small in numbers. The table below will give the averages:

Year.	Average of rings.	Age in days.	Ar. weight.	Ar. gain per day in lbs. since birth.
1883 Entries three, average		1,557	2,063	1.32
1882 Entries three, average		1,773	1,890	1.47
1881 Entries two, average		1,663	1,792	1.66
1880 Entry one		1,225	1,770	.41

In the appendix we give a table of weights and measurements of prize winners at the American fat stock show in 1884. It will be found a valuable and interesting study.

A SUMMING UP.

In summing up the whole matter of yearly gains, the editor of the *Breeders' Gazette* says:

"As was to have been expected, few of the older animals have made large gains. Mr. Sherman's Tim, now weighing 3,290 pounds, has gained 235 pounds. His next neighbor, Jim Blaine, now weighing 2,720, has gained only 185 pounds. The second heaviest steer of the show, Mr. Varnum's King David, weighing 2,835, has only gained 120 pounds. The grand Hereford steer, Wabash, weighing 2,850, has gained 410 pounds. Mr. Gillett's famous McMullin, weighing 2,710, has gained 145 pounds, while Storm, weighing 2,480, has added 425 pounds. His fine cow, Lady Peerless, weighing 2,100, has made a gain of 220 pounds. In all, eight of Mr. Gillett's older animals have made an average gain of 280 pounds. In marked contrast is the fact that six, shown as yearlings last year, have made an average gain of almost 600 pounds, varying from 525 to 695 pounds, their present weights ranging from 1,575 to 1,910 pounds. The deservedly famous

81, twenty-
refords and
teen grade
; in 1879,
eleven grade

days.	Ac. weight	Ac. gain per day since birth.
34	1,010	2.93
31	1,753	1.85
35	1,025	1.70
31	1,721	1.89
34	1,710	1.77
35	1,651	1.73

small in
averages:

	<i>Av. weight.</i>	<i>Av. gain per day in lbs. since birth.</i>
57	2,003	1.32
73	1,896	1.07
83	1,722	1.06
95	1,770	.41

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white Shorthorn, Clarence Kirklevington, weighing 2,045, has added 425 pounds. The young Shorthorn, Cassins, weighing 1,500, has only added 300 pounds.

"In comparatively few of these cases has it been profitable to hold over the steers past two years old, judging from the standpoint of sales on the general market. It is a noticeable fact that several of the animals named are not in as good form as last year; scarcely any are better; but it is fair to say that no one is much the worse."

SECTION VI.—SHELTER TREES FOR STOCK.

The question of shelter for stock is an important one. Farm animals must necessarily be exposed to the weather during many chilling storms in the spring and autumn. In the heat of summer they require shade during rest. Trees are a valuable protection to fields and also to yards and buildings. A double purpose may be conserved by planting the boundaries of pastures and meadows with trees, not in formal lines but in clumps here and there. Thus the stock may shelter themselves from wind, hail and sleet.

The value of the shelter of trees has always been underestimated. A realizing sense of its value will be understood by those who have been caught in a blizzard on the open prairie. The timber gives relief from distress that once experienced will never be forgotten.

For shelter in fields, any of the deciduous trees, of value ultimately for timber, will be useful. Evergreens may be interspersed here and there. All trees, however, must be secured against cattle, until they get large enough for shade. A wire fence close against the trees will not interfere with their value, however, as against the wind. There will always be a still atmosphere in the lee of any wind-break.

HARDY SHELTER TREES.

The faster growing deciduous trees that will be ultimately valuable for timber, are the hardy catalpa, (*C. Speciosa*). The variety *Bignonioides* is a straggling grower, and tender north of thirty-eight degrees. The hardy western variety is perfectly hardy up to forty-two degrees. Next in the order of value is white or green ash, and white maple. The latter, however, is apt to split at the junction of the limbs and trunk. Slower growing trees of value are hard maple, black walnut and elm. The cottonwoods are the fastest growing of any mentioned, but are

of but little value except for firing where better varieties will not grow. As we proceed west, the cottonwood becomes more and more valuable, as the other varieties cease to be found as not being adapted to the climate.

SECTION VII.—SHELTER FOR FEEDING YARDS AND BUILDINGS.

Evergreens make the best shelter trees. As wind-breaks they are impervious, and as valuable as they are ornamental. They give freshness to the winter scenery and will more than save the cost of planting in a single winter. If desired they may be topped at a height of ten feet, when the bottom will remain thick and impervious. If the branches encroach too much cut them back. The leading shoot once cut, the tree does not increase in height, but the laterals may be cut back with decided benefit. If a hedge-like appearance is desired, the cutting back should be so performed as to form the whole into symmetrical shape. The Norway spruce is best adapted to all locations and one of the fastest and most sturdy in its growth. Next comes the white pine. White and red cedar are better adapted to ornamental hedges. Among deciduous trees for wind-breaks none is superior to the beech. It bears the knife admirably, is close and thick, and holds its leaves persistently.

CHAPTER IX.

BREEDING AS ADAPTED TO SPECIAL USES.

SECTION I.—DAIRY FARMING.

There is no branch of agriculture that has received a more successful impetus, in the west, within the last ten years, than dairy farming. The production of milk, butter and cheese has received no severe check, and there would seem no limit to the extent of the production. Modern appliances render the manufacture exceedingly simple. Dairying is, however, exacting in labor. Milking must be done, and the milk cared for, Sundays as well as week days. Hence many persons are deterred from undertaking dairying. This, however, is not especially onerous, in connection with the care of other stock, since the same hands may do the milking as a part of their other regular work.

WHAT IS NECESSARY TO SUCCESS.

To be successful there are three principal things to receive attention: The very best possible feeding at regular and stated times; absolute cleanliness in

the stable, milking utensils, and in milking, and uniform kindness in the care and management of the cows. In fact, none but a kindly, intelligent person should be allowed about stock of any kind. Cows that are banged about, dogged to and from the pasture, and kept under the constant impulse of fear, never give good milk or large quantities of it. And a cow, once she shrinks in her milk, can never again, during the season, be brought fully back. Hence he who undertakes dairying must be about the premises pretty constantly, to know that all is going on right. He must provide plenty of succulent food summer and winter and especially during the heat and drouth of summer. If he can insure this there is nothing that will pay uniformly better than dairying.

SECTION II.—SELLING MILK AND CREAM.

If the milk is to be sold the whole matter is quite simple. The milk should be poured into a receiver from which it may stream very slowly into the can in order to receive as much benefit as possible from the air, in eliminating the animal odor. The milk should be cooled either by setting the cans in a vat of cold water, or, better, in one cooled with ice. It is then ready for delivery to the shipper. Selling milk, however, for family use, is not advisable, except near cities, since thus the calves are deprived of proper food and must be killed at once. The preferable way is to strain the milk into an open vat in cool water until the animal odor escapes and then set by any of the newer practical systems of raising the cream. Separation by centrifugal force is being improved year by year, but, as yet, submerged setting seems to claim the most advocates, perhaps because it is simple and easily managed. The cream is daily called for by the factory man, who pays by the inch.

SECTION III.—BUTTER MAKING.

There is no reason why the farmer should not manufacture directly himself, if he have the facilities for keeping the butter at a temperature of fifty degrees until sold. If all the processes have been cleanly, the buttermilk taken from the churn as soon as the butter separates into granules; if it is then carefully washed with pure, very cold water, to free it from the buttermilk, salted at the rate of three-fourths to one ounce of pure salt to the pound, and only worked to bring it into a uniform consistency, packed in jars or tubs, and kept submerged

in strong brine until sold, it will always bring the highest price from those who know the maker, or know his reputation as a butter maker.

CREAMERIES.

Creameries are simply factories where butter is manufactured from the milk made on a farm, and from cream bought from neighboring dairymen. It should have all the best modern appliances, since these alone will enable the operator to make the most money from the outlay. There are now firms, in all the larger commercial cities, whose business is exclusively dairy fixtures. The intending dairyman can easily satisfy himself through intercourse with these firms, as to what is best suited to his means. If he have plenty of capital it is better that he make both butter and cheese. If not let him confine his operations to the making of butter.

Butter factories are those where the milk is delivered daily and the butter manufactured for a fixed price per pound, the skimmed milk and buttermilk being returned. They have no advantages over, and many disadvantages as compared with the system of gathering the cream daily.

In the manufacture of butter—and the same rule will work wherever milk is present—no bad odor of any kind should be allowed. Milk eagerly absorbs any odor or taint near, or passing over it. Hence absolute cleanliness is imperative. There is much difference of opinion upon the question of churning cream sweet, and sour. The best keeping butter, and that of superior flavor, is made from cream soon after it has turned sour; but when one mess of cream is added to another, the whole should be thoroughly stirred to intimately mix all together. Unless the animal odor is first removed never use submerged setting. Raise the cream in the open air, and preferably in shallow pans. Keep the milk at a temperature not above sixty degrees, fifty is better; skim at the end of twenty-four hours; gradually raise the cream to a temperature of sixty degrees; the action of churning will generally raise it to sixty-two degrees, the proper temperature for separation of the butter. Not less than half an hour should be consumed in churning. Too fast churning never gives a first-rate quality of butter.

SECTION IV.—MANUFACTURE OF CHEESE.

Localities in England, Holland, in Switzerland and other European countries have respectively given names to the cheeses made, and these names

have been adopted in the United States. Whatever the variety, the most unswerving cleanliness must be observed. The drainage of the dairy house must especially be perfect. The floors should be of stone slabs laid in cement, all the utensils of copper or of tin must be kept scoured bright, all wooden surfaces should be kept well painted or whitewashed, and shelves must be scrubbed often enough so no odor can be taken up. The utensils must be daily scoured, brightened and summed. It may look like much trouble, but it pays. In buying fixtures always get the best. They are cheapest in the end. Then all there is to cheese making is to observe the directions exactly, for cheese making is strictly a series of chemical operations from first to last, and the conditions are constantly changing from the time the milk is taken from the cow until the cheese is ripe enough to eat. This may be hastened or retarded, and the temperature must be regulated according to the composition of the cheese. In the ripening of the cheese, heat accelerates and cold retards the ripening.

A HOME MADE CHEESE.

We use figures to show temperature. The fingers or the hand do not correctly indicate temperature, neither will the mind indicate correct lapse of time. The woman or man who is smart enough to go by guess work in making cheese never gets two just alike.

THE CELEBRATED WILTSHIRE CHEESE.

Wiltshire cheese is made as follows; and a little experience in following these directions will enable any intelligent woman to come pretty near to making a really, good cheese in the average farm dairy: The night's milk is skimmed in the morning and added to the morning's mess. The milk is set at eighty degrees and left about an hour to coagulate. It is then broken up with a circular breaker having an upright handle and used as you would push a churn dash up and down. The breaking is done gently at first. In cooking the mass is raised to one hundred degrees, stirring all the time with the breaker. It is then left to rest, and as soon as the curd can be handled it is taken out of scald and put to press. It remains in press twenty minutes; it is then taken out, ground and salted at the rate of half a pound of salt to twenty-eight pounds of curd. It is ground again and put to press. The next day the cheese is taken out of press and salted on the out-

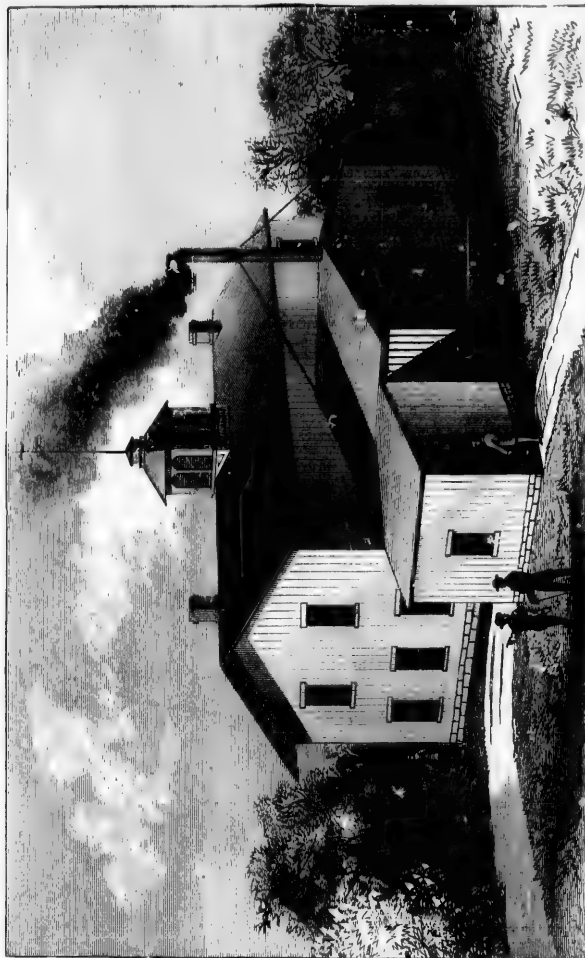
side, receives a new cloth, and is put back to press, the same course being pursued for two successive days, after which it gets no more salting, but is kept in press eight days, each day being taken out and turned. It is then put into a cool cheese room and left for a week or two and turned every day. At the end of this time the cheese will be covered with mold; then it is put in a tepid bath or moistened and the mold scraped off, when it goes to the dry room. Here it is turned every day until fit for market, say from sixty to ninety days. This is not a full cream cheese but good enough for any taste if carefully made. No person should undertake the manufacture of exceedingly rich (in cream) cheese, until some experience and a good deal of reading has given technical knowledge. A knowledge of how to make cheese perfect in every respect is not learned in a day. If it were nine-tenths of so-called good cheese makers would not so fail when their cheeses came to stand the test of the export buyers for the market.

CHEDDAR CHEESE.

In making Cheddar cheese the English process is to work the milk at a low temperature, from 78° to 80°, using some whey with the rennet according to the condition of the milk. After coagulation is perfected, which takes from forty to sixty minutes, the curd is cut in large checks, and soon after commence breaking with a wire breaker attached to a long handle. The breaking is at first slow and gentle, and is continued till the curd is minutely divided. This is effected before any additional heat is applied. The curd, it is claimed, cannot be properly broken at 90° or above 90°, and there is a better separation of the whey and condition of the curd by breaking minutely at about 75° or 80° without an increase of heat during the process. The breaking usually occupies a full hour. The heat is raised in scalding to 100°.

When the curd has reached a firm consistency, and the whey shows a slight acid change, a change so slight as to be detected only by the experienced observer, it is immediately drawn and the curd heaped up in the bottom of the tub.

Soon after the whey is drawn and the curd heaped, it is cut across in pieces a foot or more square and thrown again in a heap to facilitate drainage and develop further acidity. It remains in this condition for half an hour, the whey meanwhile flowing



A BUTTER AND CHEESE FACTORY.

slowly from the heap, when it is taken out of the cheese tub and placed in the cooler. It is then split by the hand into thin flakes and spread out to cool. The curd at this stage has a distinctly acid smell, and is slightly sour to the taste. It is left to cool for fifteen minutes, when it is turned over and left for the same length of time or until it has the peculiar mellow and flaky feel desired. It is then gathered up and put to press for ten minutes, when it is taken out, ground in a curd-mill, and salted at the rate of one pound of salt to fifty-six pounds of curd. It then goes to press, and is kept under pressure two or three days. The curd, when it goes to press, has a temperature of from 60° to 65°, and when in the cooler or sink it is preferred not to get below this point. A proper temperature is retained in the curd during the various parts of the process, in cool weather, by throwing over it a thick cloth. The whey being disposed of at an early stage, the attention of the manufacturer is to be directed only to one substance, the curd. By draining the whey and expelling it under the press, and then grinding, a uniform incorporation of this material is effected. The cooling of the curd before going to press, and the removal of the cheese, after pressure, to a cheese room, where an even temperature is kept up, differing but little from that of the cheese when taken from the press, effects a gradual transformation of the parts into that compact, mellow, flaky condition which is characteristic of the Cheddar, and at the same time preserves its milky or nutty flavor.

UPON CHEESE MAKING GENERALLY.

The quantity of rennet to be used will depend upon the strength of the solution, and the time employed and also the heat used. Only experience can practically determine these points. Hence the time employed to set the curd is given. Dr. Voelcker, consulting chemist of the Royal Agricultural Society of England, who has investigated widely in relation to the chemistry of cheese making, covers the whole ground, generally so well, that we give his conclusions. They will pay the cheese maker's careful study.

MILK AND FOREIGN ODORS.

Milk not only differs naturally in regard to flavor and keeping quality, but it is likewise prone to absorb bad smells when it is kept in ill-ventilated or damp places, or in close proximity to pig-stys, water-closets, or underground house-drains. Milk

thus tainted imparts a bad flavor to cheese, and even may spoil it altogether. Too much attention, therefore, can not be bestowed upon the treatment of milk before it is admitted into the cheese-tub. It is a matter of great importance to cool down milk as rapidly as possible after milking, and to get rid by this means of the peculiar animal flavor which characterizes newly-drawn milk. This especially is needful when the evening's milk is kept until next day, and made into cheese with the morning's milk. In many dairies a portion of the cream is removed from the milk, and the partially skimmed evening's milk being added to the new morning's milk, the cream will be equally distributed in the milk. But when the evening's milk is not skimmed and whole milk-cheese is made, care should be taken to amalgamate thoroughly the cream with the milk by gentle agitation before rennet is added. I need hardly say that the milk must be carefully strained through a cloth before it is placed into the cheese tub, and that the utmost attention must be paid to scrupulous cleanliness, and the avoidance of anything calculated to taint the milk. In good dairies no utensil is allowed to remain for a moment in an unclean condition; as soon as it is empty it is rinsed out with clean water—if necessary, scrubbed—and finally scalded with boiling hot water.

CLEANLINESS.

Cleanliness, indeed, may be said to be the first qualification of a good dairy-maid. With regard to the materials of which the pails and cheese-tubs are made, metallic vessels appear to be preferable to wooden ones, for tin pails, and tin or brass cheese-tubs can be more easily kept clean, and, unlike a porous material such as wood, they do not absorb milk, which will generate acidity, or taint milk that is placed in wooden tubs or pails. Some people maintain that milk which has acquired a faint degree of acidity is none the worse for cheese-making. This may be so; nevertheless, I believe that the fresher milk is, and the less its natural condition has been disturbed, and the sweeter, or neutral, the state of the cheese, and of the whey also, is preserved throughout the process of cheese-making, the finer the flavor of the cheese—if the operation has, however, been well conducted, and the cheese been ripened properly.

SECTION V.—PRACTICAL CHEESE MAKING.

I have seen some of the finest Cheddar cheese

made from sweet milk under conditions that allowed the whey to run off in a perfectly neutral state, so that I could not detect the faintest trace of acid by delicate litmus paper. There is no necessity whatever to harden the curd after its separation from a portion of the whey by scalding it with sour whey, nor is there any necessity for keeping the curd in the whey until it has turned slightly sour. The beneficial effect which is produced on the texture of the curd by scalding it with sour whey, or allowing it to remain in the whey until it becomes slightly acid, and at the same time raising somewhat the temperature of the contents of the tub, is due entirely to the temperature, and has nothing to do with the acid of the whey. This beneficial change may therefore be as well effected by steam or hot water as by heated sour whey, or rather I should say, is preferable to introducing your whey into the manufacture of cheese, and to conduct the process of separation of the curd from the milk, and its subsequent consolidation into a state fit to go into the presses, by gradually raising the temperature either by warm water or steam in a manner whereby a minimum amount of acidity is generated in whey.

THE CURD.

The curd, in a practical sense, or, more strictly speaking, the mixture of caseine and butter which cheese makers call curd, is a very peculiar and delicate substance, which is greatly affected by the temperature to which it is exposed. As curd at different temperatures has a direct bearing on the practice of cheese making, it will not be out of place to refer briefly to some of them. To new milk, cooled down to 60° Fahrenheit, was added a very large excess of rennet. It took three hours to complete the preparation of the milk into curd and whey. The curd was very tender, and the whey could not be properly separated from it. Milk at sixty-five degrees, on addition of rennet, curdled in two hours; but the curd, as before, remained tender, even after long standing. At seventy to seventy-two degrees, it only took from half an hour to three-quarters of an hour to curdle the milk, and the curd now separated in a more compact condition. The process was more expeditious and the curd in better condition when the temperature ranged from eighty to eighty-four degrees. At ninety degrees the rennet curdled the milk in twenty minutes, and at one hundred degrees, an excess of rennet curdled the milk in about

a quarter of an hour, separating the curd in a somewhat too close condition. By heating the whey and curd to one hundred and thirty degrees, the curd gets so soft that it runs like toasted cheese, and becomes quite hard on cooling. These experiments clearly show that the limits of temperature between which curd can be improved or become deteriorated in texture are not very wide. Too low a temperature—that is, a temperature under seventy-five degrees—keeps the curd too tender, and renders it difficult to separate a sufficient amount of whey from the curd to allow the latter to be pressed into cheese that will ripen properly without leaving or acquiring a strong undesirable flavor.

TEMPERATURE.

On the other hand, too high a temperature, that is, a temperature exceeding one hundred degrees, makes the curd unduly hard, in consequence of which the cheese does not acquire in the store-room the mellow texture and fine flavor which the curd assumes in keeping and ripening when a less elevated temperature is applied in its manufacture. The exact temperature to be adopted depends upon the description of cheese which is desired to be produced. When thin cheese has to be made, a temperature ranging from seventy-two degrees to seventy-five degrees is sufficiently high before the rennet is added to the milk, and this temperature should be maintained throughout the process by the addition of warm water, or it may with convenience be increased five degrees and raised finally to eighty degrees, but not higher. On the other hand, if the object of the cheese maker is to produce thick Cheddar cheese, the temperature of the milk may with great advantage be raised to from eighty degrees to eighty-four degrees before the addition of the rennet.

AMOUNT OF RENNET.

Sufficient rennet should be added to effect a complete separation of the milk into curd and whey in about three-quarters of an hour. The curd may then be cut into large slices, and a portion of the clear whey be run off, after which the temperature of the whole contents of the cheese-tub may be raised gradually, whilst the curd by degrees is broken into small bits, to about ninety-five or at most one hundred degrees. Cheddar cheese is apt to get hard and dry, and not to ripen properly, when it is made at too high a temperature. On no account should the temperature rise above one hundred degrees; and if

kept rather below one hundred degrees—say at about ninety-five degrees to ninety-seven degrees—the cheese will turn out all the better, if the curd be carefully broken up, and put into the presses in a perfectly uniform condition. The amount of water which is left in the curd when it is ready to go into the cheese presses, is much larger, and ought to be larger, when thin cheese, made at about seventy-two degrees to seventy-five degrees is made than in the making of thick Cheddar cheese, in which a higher temperature is usually raised. It is impossible to give the exact amount of rennet to be used for a given amount. The cheese maker must calculate for himself and learn by experience. The subject of rennets will be treated of further on.

CHESTER AND CHILTON CHEESE.

This fine cheese is made in England as follows, and in our best dairies in the United States is identical. The evening's milk is placed, not more than six or seven inches deep, in tin vessels to cool during the night, on the floor of the dairy; it is skimmed in the morning, and a certain portion kept for butter—in early summer only enough, perhaps, for the use of the house, but in autumn more, and in some dairies at length nearly all the morning's cream is thus taken for churning. The skimmed cream, with a portion of milk, is heated up to one hundred and thirty degrees by floating the tins which hold it on the boiler—sufficient quantity being taken to raise the whole of the evening's and morning's milk together to ninety degrees or thereabouts. The rennet is made the day before it is used; twelve or fourteen square inches of vell, standing in a pint of salt water, kept in a warm place, making rennet enough for one hundred gallons of milk. The vell or stomach obtained from very young and wholly milk fed calves should be used. The curd is set in about fifty minutes; it is then cut with the usual curd-breaker, a sieve-shaped cutter, very slowly. The whey is syphoned, pumped, or lifted out as soon as possible; but before it is all removed a portion is (on some farms where the Cheddar system is followed) heated and returned to the tub, and the curd is left in this hot whey for half an hour. The whey is then drained away and the curd is left to get firm. When firm enough to stand on the hand in cubes of about a pound weight—this is an intelligible indication—without breaking asunder, it is lifted out on the drainer (a false bottom of rods),

in a long tub with a stop-cock to it, and there left covered up for forty-five minutes, after which it is broken up well and mixed by hand with three and a half to four and a half pounds of salt per cwt. of 112 pounds. It is then allowed to stand with a light weight upon it for about three-quarters of an hour longer, and is turned over once or twice during the time, being cut for the purpose into squares with the knife. It is then passed twice through the curd mill, and at length put into the vat, a cloth being pressed first into the place by a tin hoop, and the salted curd being packed gently by hand within it. The vats will hold a cheese of seventy or eighty, up to one hundred pounds; and tin hoops placed within them, are used when necessary to give capacity for a larger quantity of curd.

After standing in the vat, with a weight upon it, from one to two hours, according to the state of the weather, it is turned over and put, still in its vat, into a warm chamber, where it remains at a temperature of 90° to 100° during the night. Both when in the press and here the cheese is skewered, skewers being thrust into it through holes in the vat, and every now and then withdrawn, so as to facilitate the drainage of the whey. The cheese is taken out of the vat next morning and turned upside down in a fresh cloth. It is in the press three days, and it is turned in the press twice a day, being dry-clothed each time. It is then taken out, bandaged, and removed to the cheese-safe. In some dairies all skewering is dispensed with, and no pressure is used at the time of making, nor for two days afterward; but the whey is allowed to run out of its own accord. Cheese manufactured in this way requires from five to seven days in drying, but afterward matures more quickly for market.

VARYING QUALITY OF CHEESE.

The cheese varies considerably in quality throughout the year, the earlier make of March and April being considerably less valuable than that of summer and early autumn. Some of this varying quality is owing to the quality of the milk, the cows being house-fed; but more of it is, in all probability, owing to the necessity of holding a portion of curd over from day to day, when the quantity is insufficient to make either one, or it may be two, full sized cheeses daily. In such cases it is common to make one full sized cheese, and hold the remainder of the curd over till the next day, keeping it wrapped up

on the drainer or pan, and grinding it up in the curd-mill along with the curd of the next morning.

STILTON CHEESE.

Stilton cheese, manufactured chiefly in Leicestershire, is made from milk enriched by the addition of cream, and the curd hardens into cheese without pressure. The cream of the night's milk is added to the new milk of the morning, and the rennet is mixed with it when the whole is at the temperature of 84° Fahrenheit, enough being used to make it coagulate in an hour and a half. If it comes sooner it will be too tough. The curd is not drained of its whey in the ordinary manner, but it is removed in slices with a skimming dish, and placed upon a canvas strainer, the ends of which, when it is full, are tied up, and the whey gently pressed out. It is then allowed to drain until next morning, when it is removed and placed in a cool dish, whence, cut in thin slices, it is put up in a hoop made of tin, about ten inches high and eight inches across, and pierced with holes. A clean cloth is placed within the hoop, and as the slices are laid in, a small quantity of salt is sprinkled between the alternate layers. It remains in the hoop, covered up, but without pressure. Next day the cheese is taken out of the hoop and clean cloths are applied; after which it is inverted and replaced, and pricked with skewers through the holes of the tin hoop, to facilitate the extraction of the whey. In four or five days the curd becomes firm. During this consolidating process the cheeses are kept in a place where the temperature can be maintained at about 100°. When the cheese has become firm enough, it is pared smooth and firmly bound up in a strong fillet of canvas, wrapping it around several times. The binders and cloths are removed every morning; cracks are filled up with curd; and ultimately the coat becomes hardened, and the cheese is removed to the drying room.

A careful study of the foregoing will enable any intelligent person to make cheese. A little practice will enable them to make a fairly uniform cheese, and when the conditions are uniform the cheeses will be so nearly alike that they will sell by sample upon the integrity of the maker.

ABOUT RENNETS.

It is impossible to give the exact amount of rennet to be used for a given amount of milk, and for the reason that the strength of the solution must vary. The cheese maker must know the strength of the

rennet, and then while this lasts the fixed quantity determined upon will produce constant results. The age of the calf from which the rennet is taken influences the strength. After the calf begins to eat grass the rennet loses strength. Hence Rennets from healthy calves from one week to six weeks old are preferable.

TO CURE THE RENNET.

The rennet is the substance contained in the stomach of any herbivorous animal before it has eaten grass. For then not only the curd contained or rather the serum that may be passed out, but the membranes of the stomach may be used. The usual way of preparing the vells, as the stomachs are called, is to turn them wrong side out to empty the contents, and then thoroughly cure them with salt. If they lie in salt three days it is usually enough when they may be stretched by means of a strong twig and thoroughly dried. They must, thereafter, be kept in a thoroughly dry place that they may not contract moisture. They should be kept one full year before being used.

PREPARING THE RENNET.

To prepare the rennet for use, take one gallon of tepid water to each rennet. Macerate in the water by kneading and squeezing the rennet, at intervals for twenty-four hours. Strain away the liquid, and bottle for use, keeping in a very cool place. This liquor will be of one definite strength, and thus the cheese maker may calculate perfectly just how much rennet is required for a given amount of milk. Vells, Rennets that have been once soaked, may be again salted, dried and used a second time, but it is better to use the liquor of the second soaking to add to that obtained from a first soaking, for thus a measurably equal strength of rennet may always be obtained.

SECTION VI.—MAKING DAIRY BUTTER.

The term dairy butter is now understood to be all those grades of butter made on the farm and in small dairies, but of really good grade, as contradistinguished from that made in butter factories. The quality compares favorably with the best grades of creamery butter, and when the appliances permit the use of ice, and cool storage, this butter will preserve its flavor better than creamery butter. There are certain rules, already given, as to absolute cleanliness, etc., that must be observed. The value of butter consists in retaining the aroma, after eliminating the animal odors. Pure butter is a fixed oil,

not susceptible of chemical change. Rancid butter, or butter containing any odor or flavor is butter in which the foreign matter contained therein has become putrid. In other words, pure fat oil is *not* liable to change; organic matter contained therein *is* liable to change. But butter, or any animal oil, will take up any odor to which it is exposed, and hence it holds the odors or perfume contained in the herbage eaten by the animal producing the milk.

Milk and cream is a mechanical mixture of oil (butter) and watery fluids, composing, respectively, the milk and cream. The agitation of milk and cream by churning or otherwise, separates the butter from the other component parts, but in so doing it retains not only the odors of the herbage eaten, but also any odors with which it may have come in contact, after being drawn from the cow. Hence not only the importance of preventing these by sweet pasture grasses, but also of perfect cleanliness in the herbage and in the manipulation.

SECTION VI.—GENERAL RULES TO BE OBSERVED.

Why, then, does so large a part of the butter found in our markets become rancid or otherwise saturated with unpleasant odor? The answer is, imperfect separation of the organic matter of the buttermilk from the butter, or the presence of some odor near the milk, cream or butter. The whole matter has been summed up as follows:

Milk being of itself one of the most perishable of animal products, its decomposition may have gone so far before the removal of the cream as to contaminate the fluids of the cream; and if so, then the butter, when first made, has already within it putrescent material which will soon infect the whole.

Even if the cream were entirely sweet, the milk remaining in the butter will soon decay, and if not removed will, of course, deteriorate the butter.

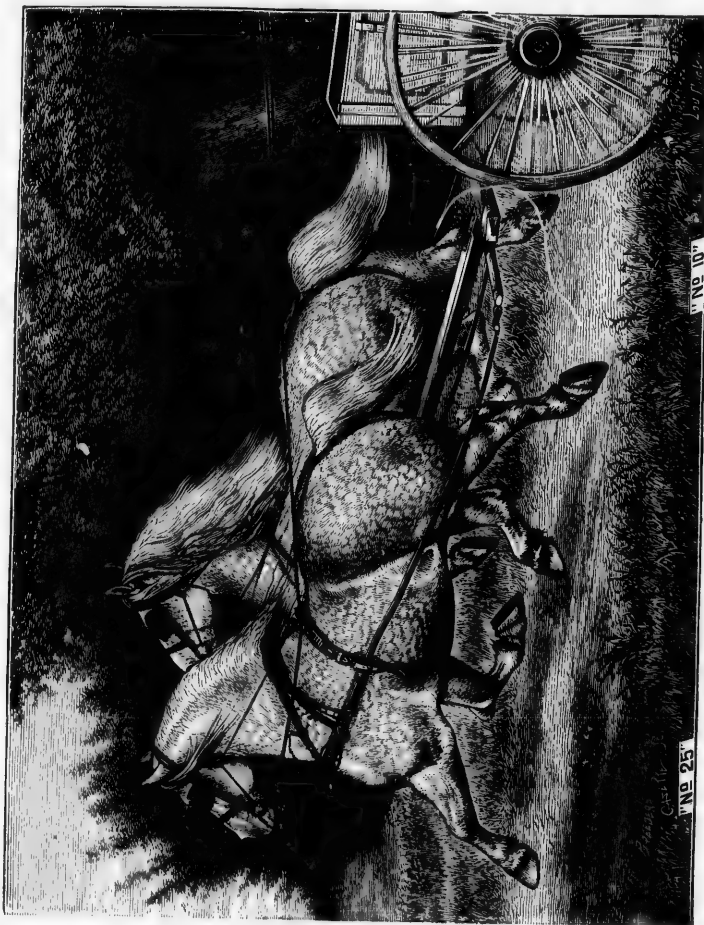
It is desirable to allow the milk to stand as long as possible, in order to secure all the cream; but in doing this, there is risk of spoiling the whole. The real decay of the milk is indicated, not by its thickening as it sours, but by the watery effusion following the thickening. The cream may remain till this thickening process is complete, without exposure to the butter, but not longer. The cream should not, for the same reason, be kept too long after being removed before churning.

The processes of churning and working the butter are as various and valuable as there are intelligent and careful housewives; but in every successful method there must be one essential—the thorough removal of the buttermilk. To accomplish this, some recommend two or three washings of the butter in cold water till the water brings away no buttermilk, whilst others rely upon thorough workings. But whatever method is used, the removal of the buttermilk is a *sine quid non*. Here again we repeat, it is better to wash out the buttermilk than to work it out, since undue working seriously alters the grain of the butter.

As the milk is warm in the process of churning, the first requisite of the butter on being removed is to be cooled. A small amount of salt may be worked in with as little effort as possible. Then it should be placed where it will cool rapidly. After a few hours it is worked, adding salt as may be needed to prepare it for market. Care should be taken that the salt be pure and good. An ounce per pound is sufficient. Five or six hours after, the butter may be worked again, the manner of working being to press with a ladle or the butter worker, not to cut it through nor spat it, the most common method and the poorest of all.

For keeping for family use stone jars are unquestionably the best. For packing for market, a new tub should never be used till it has become thoroughly saturated with a strong brine. Cover the bottom of the tub with a thin sprinkling of salt, and pack solid; and, placing a cloth over the top, sprinkle on a thick layer of salt, pouring on enough strong brine to form an air-tight covering. When it is to be sent forward to market, the brine should be poured off and a new coating of salt laid on.

This, in a nutshell, is the whole process of making dairy butter. It is as good as any swift process creamery butter ever made, is far more solid, and will keep longer without taint. It may be as well made with a dairy of five to ten cows, as with more, if cleanliness be observed and a cool, sweet atmosphere for the milk, cream and butter may be possible. Why, then, should not every farm produce good butter? It is simply a question of care in the management of the milk and in the manufacture of the butter.



PERCHERON HORSES, COURVILLE AND BAPTISTE.

Horses, Mules and Asses.

CHAPTER I.

WHENCE PRINCIPAL BREEDS OF HORSES WERE DERIVED.

SECTION I.—THE HORSE FAMILY.

The genus equus comprised not only the Horse, but the Ass, Zebra, Quagga, and the hybrids, as the Mule and Hinny, all the members of the genus being fertile together, but rarely producing fertile hybrids. Members of this family are distinguished from all others in having a single hoof only on each foot, and forming the *solitary*, or single-hoofed family, of the order *pachydermata*, animals suckling their young (mammals) which have hoofs, but which do not ruminate and distinguished for the thickness of their skin. The elephant and hog are other domestic animals belonging to the order *pachydermata*, or hoofed animals with thick skins.

SECTION II.—NATIVE COUNTRY OF THE HORSE.

All the animals of the horse family are naturally natives of warm climates where vegetation is green the year round. Their native country, and even the period of time when first domesticated, is lost in obscurity.

SUBJUGATION OF THE HORSE.

Their subjugation is only handed down through the legends of those fabulous beings, the centaurs. Egypt is the first country mentioned in the Bible where horses were used as draft animals. They are mentioned as being harnessed to the chariots of the pursuing Egyptians at the time of the Exodus. So long a time elapsed after the time of the subjugation of the horse before actual written history commenced that we do not surely know his native country. There is no certain testimony that really wild horses have existed since written history became really authentic. Horses have escaped from the custody of man or have been abandoned, as in the case of the Spanish horses in South America and in the conquest of Mexico, and have become essentially wild. This is all we are certain of.

SECTION III.—A LESSON IN BREEDING.

The original country, however, of the horse must have been a plain or open country, and one where vegetable food was always plenty, and hence the reason why, when transported to cold climates, they always became dwarfed and rough unless warmly clothed and stabled. The point to be observed here is that in breeding the horse, and the rule will hold good with all farm animals—the best success can never be had unless animals have warm shelter. The horse, the ox kind and swine are natives of tropical climates. The sheep, even with his close wool, cannot live where herbage is not always to be found.

SECTION IV.—WHERE THE BEST HORSES ARE FOUND.

The fleetest horses of the world to-day all had their origin in England. The improvement may be said to date from the time of the crusades, when undoubtedly valuable sires were brought back from the Holy Land. Even here we know very little that is beyond dispute. England and France have taken the palm for having originated the best breeds for draft purposes. Here, again, the origin of value lies in the horse of warm countries. The best general draft horse of England to-day has distinct traces of the racing blood, produced by Oriental sires on the best of the swift horses of the time of James I to that of Cromwell. The result of this breeding produced sires that improved the agricultural class of horses, which, by careful breeding and selection, have given us the Clydesdale, the Shire horse, the English heavy draft horse, and that superb draft and coach horse, the Cleveland Bay. In France the Oriental blood has been no less marked in producing that paragon of French horses, the magnificent Percheron. He comes so near to the perfect description of a horse for peace and war as given by Xenophon, and many times quoted, and is so valuable and perfect a study of a sturdy and perfect horse, containing all the essentials of everything the valuable horse should possess, that we give it, or

rather edit it, to embrace the salient points of the description. The breeder who master its principles will not err in his judgment of a horse for general utility, nor if he breed such, will he fail to sell for good prices.

SECTION V.—XENOPHON'S STUDY OF THE HORSE.

Of the unbroken colt one must judge by the bodily construction, since if he has never been backed, he will afford no very clear evidences of his spirit. Of his body it is necessary first to examine the feet, for as in a house it matters not how fine may be the superstructure if there be not sufficient foundations, so in a war horse there is no utility, no, not if he have all other points perfect but be badly footed.

THE FEET.

But in examining the feet it is befitting first to look to the horny portion of the hoofs, for those horses which have the horn thick are far superior in their feet to those which have it thin. Observe whether the hoofs be upright, both before and behind, or low and flat to the ground, for high hoofs keep the frog at a distance from the earth, while the flat tread with equal pressure on the soft and hard parts of the foot. Well-footed horses can be known by the sound of their tramp, for the hollow hoof rings like a cymbal when it strikes the solid earth.

FETLOCKS AND SHANKS.

The parts above the hoof and below the fetlocks should not be too erect, like those of the goat, for legs of this kind, being stiff and inflexible, are apt to jar the rider, and are more liable to inflammation. The bones must not, however, be too low and springy, for in that case the fetlocks are liable to be abraded and wounded if the horse be galloped over clods or stones. The bones of the shanks should be thick, for these are the columns which support the body, but they should not have the veins and flesh thick likewise; for if they have, when the horse shall be galloped in difficult ground, they will necessarily be filled with blood, and will become varicose, so that the shanks will be thickened and the skin be distended and relaxed from the bone; and when this is the case, it often follows that the back sinew give way and renders the horse lame.

THE KNEES AND ARMS.

But if the horse when in action bends his knees flexibly at a walk, you may then judge that he will

have his legs flexible when in full career, for all horses, as they increase in years, increase in the flexibility of the knee. And flexible goers are esteemed highly, and with justice, for such horses are much less liable to blunder or to stumble than those which have rigid, unbending joints. But if the arms below the shoulder-blades be thick and muscular, they appear stronger and handsomer, as is the case also with a man. The breast should also be broad, as well for beauty as for strength, and because it causes a handsomer action of the forelegs, which do not then interfere, but are carried wide apart.

THE NECK AND HEAD.

Again, the neck ought not to be set on like that of a boar, horizontally from the chest, but, like that of a game-cock, should be upright toward the crest and 'slack toward the flexure; and the head being long, should have a small and narrow jawbone, so that the neck shall be in front of the rider and that the eye shall look down at what is before the feet. A horse thus made will not be likely to run violently away, even if he be very high spirited, for horses do not attempt to run away by bringing in but by thrusting out their heads and necks. It is also very necessary to observe whether the mouth be fine or hard on both sides, or on one or the other, for horses that have not both jaws equally sensitive are likely to be hard-mouthed on one side or the other.

EYES, NOSTRILS AND CREST.

And it is better that a horse should have prominent than hollow eyes, for such a one will see to a greater distance. And widely opened nostrils are far better for respiration than narrow, and they give the horse a fiercer aspect, for when one stallion is enraged against another, or if he become angry while being ridden, he expands his nostrils to their full width. And the loftier the crest and the smaller the ears the more horse-like and handsome is the head rendered, while lofty withers give the rider a surer seat and produce a firmer adhesion between the body and shoulders.

THE LOINS.

A double loin is also softer to sit upon and pleasanter to look upon than if it be single, and a deep side, rounded toward the belly, renders the horse easier to sit and stronger and more easy to be kept in condition, and the shorter and broader the loin the more easily will the horse raise his forequarters and



IMPORTED DRAFT STALLION, 'THOMAS'.

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collect his hindquarters under him in going. These points, moreover, cause the belly to appear smaller, which, if it be large, at once injures the appearance of the animal and renders him weaker and less manageable.

THE QUARTERS AND BUTTOCKS.

The quarters should be broad and fleshy, in order to correspond with the sides and chest, and should they be entirely firm and solid, they would be lighter in the gallop, and the horse would be the speedier. But if he should have his buttocks separated under the tail by a broad line, he will bring his hind legs under him, with a wider space between them, and so doing he will have a prouder and stronger gait and action, and will in all respects be the better on them.

STALLIONS AND FOALS.

Stallions should not have the testes large, and this ought not to be overlooked in foals. To conclude, in regard to the lower joints of the shanks, namely, the fetlocks and the hoofs, behind, I have the same remarks to make, and no others, than those which I have made above.

XENOPHON'S ACUTE OBSERVATION.

In reading the foregoing it will be seen that Xenophon, only less celebrated as a great general, than a correct writer, understood perfectly what a perfect horse should be. In his time the horse was used especially as a charger. Hence when he speaks of a broad chest, he does not mean a chest with an appearance of breadth from a superficial front view, but that wedge shaped chest of great muscularity which is really broad. His idea of the increasing flexibility of the knee with age until the full maximum is reached is also according to the best judgments of to-day. He understood the full importance of the flexible fetlock, the sloping shoulder, and the double muscular loin, the arched neck, the eyes set so the horse could see both before and behind, the wide (muscular again) buttocks, the wide nostrils, and high couraged, intelligent horse generally.

SECTION VI.—BREEDS OF HORSES, THOROUGHBREDS

Outside of the better horses of the Arabians there is no pure breed existing. They are all composite in their nature or made up by the crossing of one artificial race with another, and subsequent selection. Of the artificial breeds the Percheron comes nearer to being a pure breed than perhaps any other, showing

this in uniformity of color and the ability to perpetuate fixed characteristics upon their progeny. Even the English and American thoroughbreds that have been bred in certain fixed lines for two hundred years vary largely in color, stoutness, and other characteristics, but they are constant in one thing, great speed and the ability to carry weight, combined with the most unflinching courage. So well known is this among breeders and trainers that it has become an axiom that a horse with a flaw in his pedigree, that is, a cross of cold (common) blood is worthless for training. There is, however, a limit to the speed of the race horse.

AN ENGLISH WRITER'S TESTIMONY.

An English writer, "Stonehenge," one of the most reliably honest, graphic, and accurate writers of the latter half of the present century, says that from a careful examination of the racing time-tables as recorded of late years, it will be seen that from thirteen and a half to fourteen seconds per furlong is the highest rate of speed attained in any of our (English) races above a mile, and with eight stone, seven pounds, (119 pounds) carried by three-year old horses.

ANGLO-AMERICAN VIEW.

In relation to the origin and breeding of the thoroughbred, "Frank Forester" truly says they are made up of various bloods, and inherit from Oriental blood, style, and soundness in wind, limb and loof. By careful breeding through many generations the speed has been increased, while the general constitution has not specially suffered. Artificial care has made an artificial animal of him, yet certainly the blood-horse of the present day is far superior to his masters either on the Oriental or British side; as far superior in speed and stoutness as are the modern Shorthorn and Hereford cattle superior in beef points to their progenitors of one hundred and fifty years ago.

AMERICAN THOROUGHBREDS.

Breeding as Americans have, for the last one hundred and fifty years, from the best and most distinguished English blood, American thoroughbreds have not deteriorated. Our climate (the middle region of the United States) is more congenial to the horse than that of England. The proof that our horses have not deteriorated is that American bred horses have won laurels on the English turf (the severest test to which they could be put) over the best and stoutest of English thoroughbreds.

SECTION VII.—THE TROTTING HORSE.

If England has produced the thoroughbred, the United States has produced the trotting horse, *par excellence*, of the world, no other country producing horses worthy of the name except Russia and this country not rising far above mediocrity. The American trotter arose from a desire to produce horses that in harness would compare favorably with the running class. Their fame has gone over the whole civilized world, and sires are now being eagerly sought in many countries. It is enough honor to the thoroughbred that the excellence of our trotters trace back to them on one side, to the incomparable Messenger, and the distinguished Bellfounder, the latter supposed by many not to be purely thoroughbred. A careful selection of progeny has resulted already, in strains that may be relied on to trot and trot very fast, and in such phenomenal horses for courage, stoutness and wonderful fleetness, reaching back to Lady Suffolk, and culminating in the flashing speed of Dexter, Maud S. and Jay-eye-seo.

SECTION VIII.—SADDLE HORSES.

Our saddle horses should not go unnoticed. There is a constantly increasing demand for elegant horses of easy and trained gaits. The thoroughbred sire is here again the basis of excellence. They are produced by thoroughbred sires elegant in form and light in the forehand, upon roadsters and pacing mares not fast enough for the trotting ring. They bear the same relations to our tastes that the English hunter does to that of the gentlemen in England. There will be a constantly increasing demand for this class of horses, the stouter for gentlemen's use, and the lighter and more elegant for ladies. The increasing wealth of the country will demand this class of horses more and more. To-day they are among the highest priced horses we have, outside the fast ones of the turf. The first of the horses thus far described is distinctively English. He has found a true home of adoption in America. The others are distinctively American. We may well be proud of the success attained in the last fifty years in the production of animals of such distinctly marked traits and goodness.

PACERS.

The last four years has produced a wonderful impetus in the breeding of pacing horses. We believe pacing to be more a matter of training than anything else. Though the hereditary inclination to

pace is too distinctly marked in breeds or rather strains, in various countries and even in some wild horses of the plains to doubt its hereditary character. Fast trotters have been made fast pacers by training, but the evidence is still stronger as showing that a pacer may be also made to trot fast. The pacing gait is the fastest gait of the horse except running, as is evidenced in the time of Little Brown Jug, and Johnson; wonderful indeed when we consider the comparatively small number of pacers in comparison with that of trotters.

SECTION IX.—ROAD OR BUSINESS HORSES.

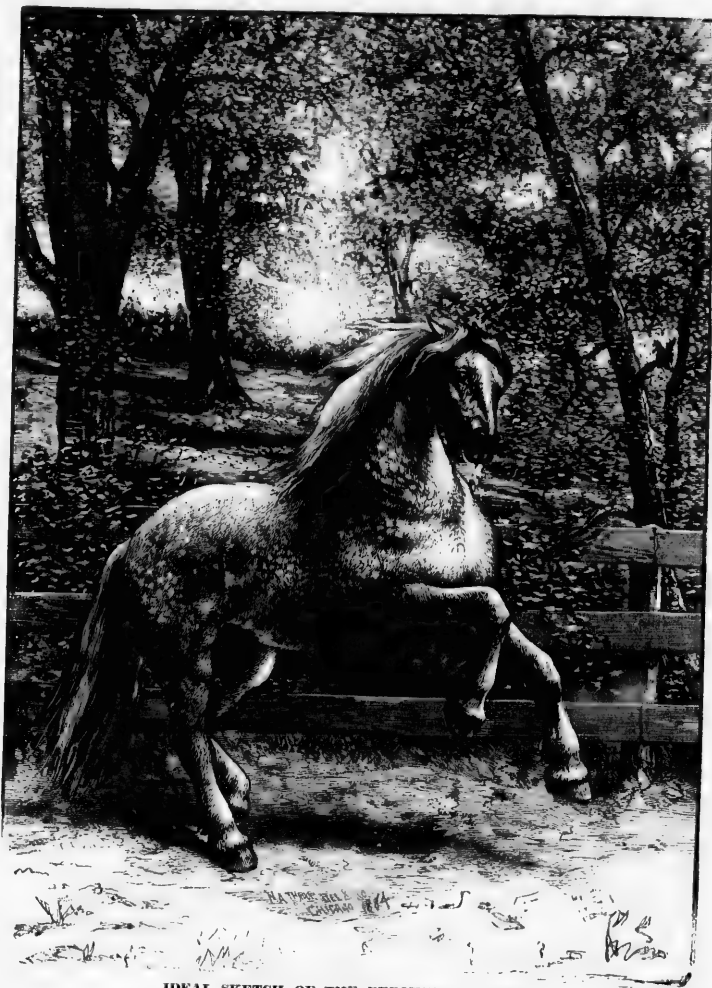
There is little to be said of these as a breed. They are composed of any stylish horse, not fast enough for the track, but possessing good speed and great bottom for the best class, and any horse of strong endurance and fair speed and beauty, united to good temper for all other classes of roadsters. No horse can be called a road horse unless he can do ten miles an hour in good style without distress. If he do twelve he is a good one. If he be handsome, good for a mile between 2:30 and 3 minutes, and fourteen miles an hour and trusty, do not be afraid to put a long price upon him. Some one with a deep pocket will want him. The road horse, like the trotter, is distinctively an American horse, although such horses have been sought for in England since the day of "Dandy Dinmont," immortalized in the novels of Sir Walter Scott.

SECTION X.—DRAFT HORSES.

All other horses, except those already named, may properly be classed under the head of draft horses. They are sometimes called agricultural horses, a misnomer, however. The true draft horse is one used for drawing heavy loads on roads, and since the advent of railroads, more distinctively those used in cities for trucks and other wheeled vehicles used for transporting heavy articles. The English draft horse, the Shire (Scottish-English), and the Clydesdale (Scottish), are the most valuable of the horses of English origin.

CLEVELAND BAY.

This magnificent representative of what might be called the English medium draft and coach horse, is a compound horse with one-fourth to three-fourths of thorough blood. They are certainly the handsomest of draft horses, and as valuable as carriage and coach horses as they are for draft. The



IDEAL SKETCH OF THE PERCHERON HORSE.

superior ones, too good for draft, often bring high prices for vehicles of style and pleasure.

THE NORMAN AND PERCHERON.

There has been much acrimony displayed first and last over the name of the French draft horse. As a compromise, the name Percheron-Norman (a sad misnomer), was adopted by many. The French stud book has probably finally settled the matter by adopting the name Percheron. The heavier class however will, probably long if not permanently, retain the name of Norman. It is, however, to the district of Perche, France, that we are indebted for the importation of this wonderful horse for draft and travel. A horse capable of eight miles an hour, drawing a heavy diligence (coach) and passengers, over by no means perfect roads, honest at a dead pull, quiet and playful in disposition, and with the courage of a thoroughbred, united to the docility of a dog, soon became a favorite with the farmers of the United States. There are probably more of this breed in the West to-day than of all other breeds of distinctively draft horses. They fairly divide the honors with the noted English breeds, the Clydesdale, Shire horse and English draft horse. Each have their distinctive admirers, and either are good enough for any draft requiring a dead sustained pull. The grades and crosses of all are eagerly sought by city teamsters, as show and heavy team horses.

CHAPTER II.

VALUABLE BREEDS OF HORSES COMPARED.

SECTION I.—FRENCH BREEDS.

The Norman, Norman-Percheron or Percheron are names used to distinguish a class of horses long celebrated for their powers of endurance on the road and their ability to pull heavy loads at a swift pace. They should be definitely known by a single name. There are, indeed, two classes of French horses, descendants of one original stock, probably, one heavy, sometimes weighing two thousand pounds, the other a lighter animal, originally weighing one thousand two hundred pounds to one thousand four hundred pounds, and before railroading days used to draw the heavy diligences of France, over by no means good roads, and up to a pace of eight miles an hour. These are now bred up to a weight, often, of over one thousand six hundred pounds.

There is said now to be none remaining of the

lighter and more active French horse of fifty years ago. The heavy horse of Normandy is reported to have been produced by crosses upon the heavy Belgian and Flemish mares, while the horse of Perche retains more of the activity and fire of the original breed.

PERCHERON VS. NORMAN.

As to the proper name to distinguish these French horses, the controversy having been long, and at times acrimonious, the probability is that it will result in retaining the name of Percheron for the lighter and more active animal, and that of Norman for the heavier horse. The editor of the "Percheron-Norman Stud Book" seemed himself at a loss as to what constituted fitness for entry, and the plan finally adopted was to admit to registry all horses imported from France as Percheron, Norman, Norman-Percheron, or Percheron-Norman, giving a full account of the course of breeding and crossing practiced in France.

THE PERCHERON STUD BOOK.

The Percheron breeders of France now have a distinctive stud book, in which animals are admitted under this distinctive name. Whatever may be the issue of the controversy, both strains perpetuate their distinguishing features and traits in their impress upon the foals of mares to which they are bred.

MEDIUM FRENCH HORSES.

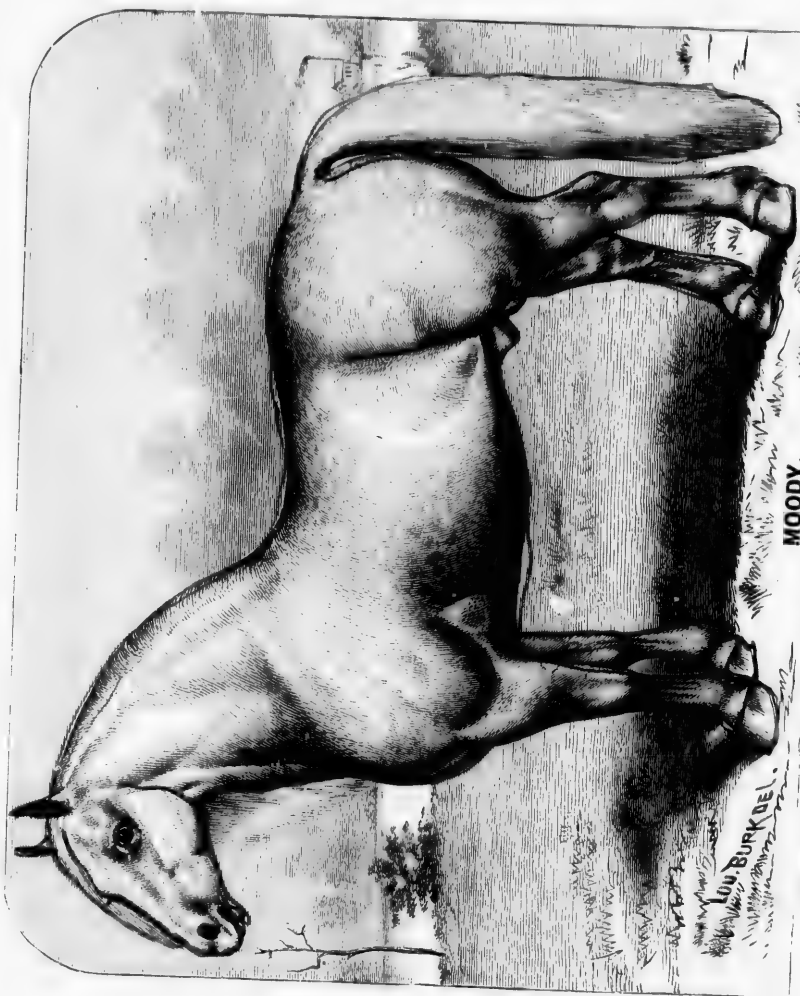
The medium horses have great bone, substance, style and carriage, added to ability to draw a moderate load at a swift pace, and the most unflinching steadiness at a dead pull. They also cross kindly on the average mares of the country.

THE HORSE OF ARDEN.

Arden formerly had a local reputation in France, for a distinct breed of horses. They have died out, and to-day the Percheron probably stands high in both France and the United States as a horse superior in all that constitutes honesty, stoutness, speed and endurance at a load.

SECTION II.—ENGLISH BREEDS.

In no country in the world has the breeding of horses, for special uses, been carried to so high a degree of perfection as in England. The thoroughbred, for racing, the hunter, capable of carrying weight at a fast pace or in leaping, the saddle horse, noted for symmetry, beauty and variety of paces, the carriage horse, elegant in form and action, and

**MOODY.**

NORMAN STALLION—Weight, 1,806 Pounds. Property of John M. Ellsworth, Dodgeville, Iowa Co., Wisconsin.

the gentleman's driving horse,—these all owe their special value to one original source.

THE THOROUGHBRED IMPRESS.

The thoroughbred is the medium through which this value has been transmitted down through all the others named. This wonderful horse has also been a strong integer in the improvement of all British breeds, except perhaps the elephantine cart horse, which is fast being pushed aside by other breeds.

Of the valuable distinct breeds of English horses, outside the thoroughbred, the only classes necessary to be mentioned will be the Clydesdale, the Shire horse and the Cleveland Bay, these three alone being of special value in American breeding for draft purposes.

SECTION III.—BREEDS VALUABLE IN AMERICA.

The breeds of horses in America and their special value may be divided into two general classes, viz., Horses of speed and horses of draft. The first owe all of their superior qualities to the impress of thorough-blood. The thoroughbred, is distinctively an English breed, and the trotting horse as distinctively an American breed, though derived originally from thoroughbred horses with trotting action, the great progenitors of which were Messenger and Bellfounder,—the latter claimed by some as not strictly thoroughbred.

DRAFT HORSES.

Draft horses, to satisfy American ideas, must have stoutness, weight, and the ability to move a heavy load at an active pace. Our lighter draft horses—those used for lighter express work, horse cars, and general farm work—are made up of mixed blood. They are active, of medium size, weighing from one thousand to one thousand one hundred pounds, and without fixed characteristics except patience, honesty, intelligence and activity. When the reverse is found it is the result of abnormal qualities or the consequence of vicious drivers.

Increasing interest in breeding is gradually modifying the common horses of our country, and a comparatively few years will probably see the horse of America more accurately defined as to breeds, containing more valuable characteristics than those of any other country.

The diversity of climate, situation and temperature will demand this. They will be built up on the

foundations already existing, through careful selection and breeding to the Cleveland Bay, the Clydesdale and Shire horse of Great Britain, and the Percheron horse of France. Beyond these breeds there is nothing to be desired, so far as draft horses are concerned.

SECTION IV.—THE THOROUGHBRED AND ITS USES.

The interest in thoroughbred horses in the United States is gradually giving place to the trotting pace. It is natural that it should be so in an open country where the nature of the soil renders good roads easy to be had. The chief value of the thoroughbred in the future will be to infuse a dash of its mighty blood, occasionally, into the other breeds, to hold the quality of our pleasure, saddle horses, our carriage horses, and those of our cavalry intact, and also to continue our trotting horses upon the high plane they now occupy.

With the growing wealth of the country there will always be a strong demand for staunch sires, of bone, muscle, and that high breeding that will enable an animal to go three miles at great speed without distress, or to go three heats of one mile each in from 1:50 to 1:55 minutes. Such horses will perform great journeys at a fast pace without flinching. The day of the "quarter nag" has long since passed in the United States.

SECTION V.—THE TROTTING HORSE AND ITS USES.

The trotting horse is valuable for many purposes in breeding. He can give fine action to carriage horses, qualities of stoutness, speed and endurance to all driving horses; and those not good enough for pleasure driving will still be superior to the common horse, for all light work, where speed is an integer—for all good trotting horses must necessarily be stout. From our trotting horses will arise sires of fine style, great courage and endurance, with smooth flowing outline, not fast enough for the best track time, but none the less valuable—nay, more valuable—from added size and beauty, to produce all that class of driving horses requiring both style and speed. Our trotting horse is still in a transition state. It is less than fifty years since they have been distinctively recognized, and only within the last quarter of a century have they been so systematically bred that a fair degree of certainty could be predicted in their outcome.

LOWERING RECORDS.

The wonderful lowering of mile records in the

last few years would seem to indicate that a still nearer approach to the speed of the running horse is to be attained. In the running horse speed is attained by the extension of the leaps; in the trotting horse it lies more in the ability to gather quickly than in the running horse. It is more than probable that the wonderful increase in trotting speed during the last twenty years is due to the constant work the best sires have had to undergo. It may serve to teach every class of breeders that disuse of exercise will degenerate the get of any breed.

SECTION VI.—PACING AND PACING HORSES.

Pacing horses as a distinct breed have ceased with the dying out of the Narraganset pacer of New England. The loss is, however, made good in the natural ability of all horses to pace, and hence it becomes easy to instruct the saddle horse, not only in this pace but also in the several modifications, as single foot, rack, amble, etc. In pacing the two legs of a side act synchronously, or together, and thus the horse attains a speed greater than in any other way, except by the running gait. And this it has been made to approach very closely. The amble is a slow pace. The rack is a slow, single foot gate, and all are modifications of the pace or amble.

SECTION VII.—DRAFT HORSES COMPARED.

The Vermont draft horse and the Conestoga horse—both now extinct as breeds—are the only representatives of distinctively draft horses originating in the country. The Vermont Draft horse may be said to have compared with the Suffolk Punch of England, also extinct, and the Conestoga would seem to have approached the German and Flemish heavy horse, modified by thorough blood and our peculiar climate. Admirable as were these horses as I knew them forty years ago, their loss is not to be regretted. Their places are more than supplied by the Percheron of France, the Clydesdale and Shire horse and the Cleveland Bay of England.

These and their crosses on the mixed blood of our country will satisfy every want of our people for style, weight, and the ability to move heavy loads for long distances. The Cleveland Bay will cover the ground for stylish teams including carriage use. The Clydesdale and the Shire horse for heavy logging and heavy draft in cities, will leave little to be desired, and the Percheron for that great variety of uses which the American farmer must put his teams

to, and for the various purposes of draft required in cities, will be found to fully cover every requirement.

SECTION VIII.—GENERAL PURPOSE HORSES.

We object to the breeding of horses that are expected to cover all the qualifications required of the horse of the day. The day of sluggish brutes of enormous weights has passed. The day of "weeds," the original horse of all work, is fast passing away. The horse must now be bred for a distinctive purpose, else the breeder will find himself with stock that will bring less in the market than a good three year old steer. Yet the type that will always outnumber that of any other one breed will be the horse fairly good for many things. We believe it lies in a grade between the Percheron, or the Clydesdale, and the trotting horse. The latter is a horse of great muscle and powers of endurance. The two former have muscular development in the line of strength. All have good lung power, a qualification that must always go with good limbs to produce a valuable horse. A combination of the qualities of these three ought to produce as near an approach to a horse for general use as the farmer could well desire.

SECTION IX.—CARRIAGE HORSES.

The carriage horse of England even, where such attention is paid to special breeding, is a horse of mixed breed, but all with more or less thorough blood in them. The Cleveland Bay comes nearer to perfection in this respect than any other. In relation to what they should be "Stonehenge" has described this horse so graphically as to leave little to be desired. It may be summed up in high action, beauty of form, strong clean limbs, excellent hoofs to stand the wear and tear of pavements. Sagacity, courage and tractability are all essential. These, with oblique but muscular shoulders, short back, and long though strong quarters, with a good deal of ground covered below, constitute the remaining points characteristic of the perfect carriage horse.

SECTION X.—DRIVING HORSES.

The perfect driving horse, like the carriage horse, must be handsome in form and action. He must also be speedy, high couraged and tractable. His size is less than that of the carriage horse and he is generally better bred. Our best driving horses are those trotting horses not fast enough for the turf.

In the class called road horses, beauty and form is secondary to speed and stamina. For the family

horse, beauty of form and grace of action is more valuable than mere speed. When both are combined the price lies well toward the scale of the fast trotter. Some mares of every breed have the power to produce colts with form and action like the sire. Such mares are invaluable for breeding to stallions possessing the requisites we have stated.

SECTION XI.—PURE BRED VS. THOROUGHBRED.

There is much confusion among farmers—and sometimes among those who call themselves breeders—in the use of terms. A wild animal is of pure blood. It is bred so constantly alike in color and characteristics that none but those critically educated can detect differences. There really are none that are essential differences. In horse the Arabian alone approaches to the standard of a pure breed. The term, therefore, may be allowed in order to express a breed that is uniform as to color, form and general characteristics. In cattle it is applied especially to the North Devons.

The word thoroughbred is used to distinguish animals of mixed origin, that by careful breeding and selection, preserve and perpetuate the characteristics sought. It is only applied to those horses used for racing. The horse of Perche, France, comes nearer to a pure breed than any outside of the desert Arab. They have been bred in line for hundreds of years, certainly from the day of Charles Martel. But these really are of mixed origin. When they shall have been bred and their pedigrees established for a sufficient number of generations to warrant it, these may be termed thoroughbred. So may the Clydesdales and other distinct breeds. When that day comes, we may use the term thoroughbred trotters, thoroughbred Clydesdale, thoroughbred Percheron, etc. Now these must all be classed as in the transition state, as contradistinguished from the mixed breed of a country made up of various crosses indiscriminately obtained.

CHAPTER III.

THOROUGHBRED HORSES.

SECTION I.—DERIVATION OF THOROUGHBREDS.

Stonchenge, who is as accurate as he is graphic, places the English thoroughbred of 1750 as follows:

1. *Native mares*, used for racing, and bred from Spanish and English strains, the former most probably descended from the Barbs of Morocco.

2. *Markham's Arabian*, imported in the time of James the First, but proved to be good for nothing, and most probably there is now not the slightest strain of his blood extant.

3. *Place's White Turk*, extensively used, and to him most of our best horses can be traced, through Matchem.

4. *The Three Turks*, brought over from the siege of Vienna in 1684.

5. *The Royal Mares*, imported by Charles the Second, who sent his Master of the horse to the Levant to procure them. These also are mentioned in all the best pedigrees.

SECTION II.—THE MODERN THOROUGHBRED.

To define the thoroughbred horse of the nineteenth century, says Stonchenge, is easy enough, because it is only necessary to adduce the law that he must appear in the "Stud-Book." Without this testimonial evidence no other will be received, nor even theoretically can any other be adduced. By some it is supposed that he is a horse descended from sires and dams of Eastern blood, that is, either Turks, Barbs or Arabs; but this has long been known to be a fallacy, for we find numerous gaps in almost all the old pedigrees, which there is every reason to believe ought to be occupied with the names of native or Spanish mares. But though "The Stud-Book" is thus received as the existing authority on this matter, it is open to a question whether it may not be desirable to amend it by introducing into its pages horses and mares which can be proved to be stainless for a certain number of generations. The subject is a difficult one, for while it is comparatively easy to keep a record year by year of the foals as they are dropped, it is extremely difficult to obtain satisfactory proof of similar facts which occurred six generations back, and this would be the earliest period at which it could be supposed that the stain of impure blood could be washed out. For instance, supposing a thoroughbred horse is put to a common mare in 1859, and the produce is a filly in 1860; this filly might again breed a filly in 1864, and have a grand-daughter in 1868, and a great grand-daughter in 1872, and so on to the year 1880, when the produce would still be composed of one sixty-fourth part common blood and the rest thoroughbred. But twenty years would elapse without any public record of the facts, and we all know how difficult it is to disprove any statement

made under such circumstances. The safest plan, I believe, is to adopt the course now pursued, unless it can be shown that it is expedient to cross the blood of our thoroughbred stock with some other strain for the sake of improving it. An Eastern horse is at once admitted as being supposed to be of pure blood, and there is, therefore, no difficulty in his case, nor would there be any in the other to which I have alluded if a public declaration were made before hand, but for this there is now no provision. There is no doubt that when half-bred races were in fashion numerous exchanges of foals took place, by which thoroughbreds were made to appear as half-bred and *vice versa*. But though the pseudo half-bred may be able to compete with the winner of the Derby or St. Leger, and though his appearance may be almost proof positive of the purity of his blood, yet he is excluded from the "Stud-Book" forever. In this way some of our half-bred stallions are known to be of pure blood, and their stock is of great value in the hunting-field, but no one would breed from a mare of this kind, because he would know that the Stud Book pages are shut against him, and he could not claim that her produce should receive the seal of purity afforded by that standard.

SECTION III.—THE AMERICAN THOROUGHBRED.

Until the English thoroughbred horse is described, it is scarcely possible to enter fully into the pedigree of the American, descended as the latter is from stock imported from the mother country. But, taking the fact for granted, I may proceed, says Stonehenge, to allude to the progress which has been made in the United States, from the date of the first importation. It appears that shortly prior to the year 1750 a Mr. Ogle, the Governor of Maryland, was in possession of Spark, presented to him by Lord Baltimore. About the same time he also imported Queen Mab, by Musgrove's grey Arab; and soon afterward Colonel Tasker obtained Selima, daughter of the Godolphin Arabian; while Colonel Colville's Miss Colville, known in the English Stud-Book as Wilkes' Old Hautboy mare, Colonel Taylor's Jenny Cameron, and Routh's Crab, were severally introduced into the colony. In 1747 Monkey, by the Lonsdale bay Arab, though in his twenty-second year, crossed the Atlantic and got some good stock, followed during the next year by Jolly Roger, by Roundhead, out of a Partner mare.

About 1764 Fearnought, a son of Regulus and Silvertail, and therefore of the very highest English blood, went to America and within a few years of that date Morton's Traveler, by Partner, out of a mare by the Bloody Buttocks Arabian, which completes the list of the importations prior to the War of Independence. It must be observed that before the year 1820 no Turf Register existed in America, and hence there is not the same guarantee for the fidelity of a pedigree as in England, where there are authentic records which reach to a much earlier period. The Revolutionary war upset the homes of so many families, that multitudes of documents were lost; but, nevertheless, I believe sufficient has been preserved to prove the authenticity of the pedigrees belonging to the horses which I have enumerated, and whose progeny can be traced down to the present day, their blood being mingled with that of numerous importations of a more recent date.

SECTION IV.—NORTHERN AND SOUTHERN RIVALRY ON THE TURF.

The love of racing was very soon implanted in the colonists of Maryland and Virginia, from whom it spread to North and South Carolina, and in these southern states the sport has been kept up to the present day with great spirit. Tennessee was inoculated with the virus of the racing mania soon after its first settlement, as also may be said of Kentucky, both states having possessed some very celebrated horses at various times. New York joined in at a much later period than the southern states, no organized racing club existing there until after the commencement of the present century, although there were small race-courses at Newmarket and Jamaica before the Revolution. But the energy of the true Yankee sent the New Yorkites ahead, and they soon became worthy rivals of the southern statesmen. From 1815 to 1845 the great stables of the north and south were carried on under a most honorable rivalry, but at the second of these dates it so happened that a vast number of the most energetic supporters of the turf in the northern states withdrew from the arena, and as they disappeared none filled the gaps, except a few professed trainers and jockeys, who carried racing on entirely as a business, and regardless of that honorable spirit which had previously distinguished it. Trotting also came into fashion, and the fanatics preached a crusade against both, which took double effect upon

the sport, already tottering to its fall. It may, indeed, be said that from 1845 to 1855 racing in America was confined entirely to the south, but about 1855 or 1856 a new jockey club was established in New York, and its members laid out a new race-course on Long Island; but still the second effort was not equal to the first, and New Orleans has taken the wind altogether out of the Long Island sails, by the spirited attempt determinedly made by Mr. Ten Broeck to match his stud against the first English horses on their own ground. That he has failed in carrying off the Derby with Umpire is no proof of the general inferiority of American horses to those of England, any more than his other great successes are enough to ensure a conviction of the opposite condition in an unprejudiced mind. Umpire might have been an exceptional horse, and granting to him the high form which he was in the year (1859) assured to possess, it would prove nothing *quoad* the general form of the horses of his country. Still it cannot be denied they are much nearer to our own than was believed to be the case before Mr. Ten Broeck came among us; but how near they are is yet a vexed question, which will take some time to settle.

THE SETTLEMENT OF THE QUESTION.

That they have shown themselves fully the peers of their English contemporaries since Stouchege wrote, is shown by their records on the English turf, and their wonderful records at all distances in the United States.

SECTION V.—INFLUENCE OF CLIMATE ON THOROUGH-BREDS.

That the dry bracing climate of the United States is congenial to the horse needs no argument to settle the question. The dry oriental plains was the home of the wild horse. Elevated table and rolling lands become their natural home whenever they escape from domestication and return to their feral state. The elevated tropical regions of South and North America, and especially the sub-tropical regions, show this conclusively. Hence in a domesticated state, outside of such regions, their care must be artificial in proportion to the rigor of the climate. Our spring, summer and autumn climate meets the natural requirements fairly. Hence their care in summer needs to be less artificial than in England. Our winters are cold, and the horse being sensitive to cold, warmth must be provided artificially. The

wise man will never grudge, therefore, warm stables and blankets. In fact, this is becoming so well understood that now no intelligent farmer grudges this additional expense and care, since he sees the immediate benefit accruing therefrom in the care of the ordinary horses of the farm.

SECTION VI.—THE PRACTICAL VALUE OF THOROUGH-BREDS.

The value of thoroughbred blood is seen in the stamina, speed, courage, stoutness and intelligence they impart to their progeny. They are pleasure horses distinctively, when used for the saddle, and their practical value in crossing upon other horses has already been generally explained. The breeding of thoroughbreds, however, is not to be undertaken, except by a special class who breed for a single purpose—speed on the turf. Nevertheless the general farmer may profit by this.

A stout, muscular thoroughbred, not swift enough for the turf, but whose lines of breeding are correct, will be valuable to improve any cross-bred animal lacking in the essentials of the thoroughbred. That this may be more readily understood we give the measurements (average) of six horses considered to be of perfect symmetry. Two of these were celebrated stallions, two thoroughbred hunters and two chargers of great value. The horse (not a dray horse) which approaches this will always sell for a large price. The average is as follows:

	Inches
Height at withers and crop.....	63
Length from shoulder-point to quarter.....	66
From the lowest part of chest to the ground.....	36
From the elbow-point to the ground.....	39
From the withers to the pole, just behind the ears, in a straight line.....	30
The same measured along the crest.....	32
Length of head.....	22
Width across the forehead.....	9½
From the withers to the hip.....	22
From the stifle to the point of the hock, in the attitude shown in the plan.....	28
From the root of tail to stifle-joint.....	26
From the point of the hock to the ground.....	22½
Length of arm from the elbow to the palfirm-bone.....	19½
From the palfirm-bone to the ground.....	19½
Girth varies from 76 to 79.	
Circumference of fore cannon-bone 7½, 8, 8, 8½ and 9 inches.	
Circumference of arm just below the elbow, 14½ to 18 inches.	

SECTION VII.—SADDLE HORSES.

In the breeding of saddle horses the farmer must not be guided by English ideas of a saddle horse. We are not a hunting people. We take more pleasure in driving than in riding. Our salable saddle

horses must be handsome ponies, fit for children to ride, or elegant and carefully gaited horses of good breeding, for ladies' and gentlemen's use in the parks, boulevards and other pleasure drives of our cities. The first is supplied by Shetland ponies, small Morgans and other cob horses, wherever they may be picked up. The latter, by horses of more or less breeding, from the thoroughbred districts. There is a money in the special breeding of this class of horses, unless the breeder is a trainer as well. The same will apply to hunting horses. Our hunting horses are taken from staunch, high bred or thoroughbred horses. They should be handsome, but whether so or not, they *must* have the ability to take high and extended leaps, to carry weight and to gallop long distances without distress.

CHAPTER IV.

TROTTING AND ROAD HORSES.

The breeding of trotting and road horses may not be undertaken by the general farmer, except it be as an independent profession separate and distinct from his ordinary farm labor. They are never bred from that class of horses adapted to farm labor, at least not economically so. The trotting horse and also the road horse is nowadays a horse of distinct blood. It is true that the form of a colt is in a good degree determined by the sire. This is when the sire, being better bred than the dam, is prepotent; but something more is wanted. The dam must herself be bred in proper lines, to make the breeding of horses of special merit more than a lottery.

The drawing of a prize in a lottery is carefully heralded far and wide. Ignorant persons suppose they may be struck by the same kind of lightning. They do not estimate the hundreds of thousands of dollars sunk in the lottery pool for every thousand dollars paid in prizes. A horse of great power is occasionally found, about whose breeding very little is known. Even among the better bred horses, a phenomenon is one of a thousand, and winners of important events one of a hundred.

This should satisfy the farmer that his lines do not lie in that direction. He may be successful in breeding horses good for the farm, the carriage, and as average driving horses. These animals are available before sale for farm work. If he attempt to breed horses for the track or for fast road work, they must not be put to hard pulling. They must be

carefully handled and specially trained. This should be a sufficient explanation of the statement that the farmer cannot expect to produce horses of high powers of speed from the mares of labor on the farm.

PREPOTENCE.

The tremendous stride of the get of Hambletonian and other great sires has been intensified by being bred for generations to mares of like quality. They have thus gathered energy and stoutness, have in fact become prepotent in this respect. A fast horse is always a stout horse. It takes excellent combination of bone and muscle, as well as good training, to enable an animal to go a long distance at a slashing gait. A fast horse may not be a beautiful horse, according to the average conception of animal beauty, but he will be a symmetrical horse.

THE ROAD HORSE.

A road horse should be stylish; he need not be fast, as capable of going a mile at great speed; he should be capable of going many miles at a comparatively high speed. Symmetry, good size, color and style are important. Then the greater the speed for five or ten miles the greater the value of the horse or team. A long slashing-gaited trotter is generally not a pleasant road horse. A pony-gaited horse is seldom a fast trotter; yet a combination of these gaits makes a good road horse, and often a good trotter.

SECTION II.—ADAPTATION OF MEANS TO AN END.

The breeder must decide definitely what he wishes to produce. He must then figure up whether his means will allow him to carry out the idea. If not abandon it at once until you have made money to do so. Suppose the farmer wishes to breed trotting horses. He has not the means to buy a stallion and mares of blood suitable to the work. Perhaps if he had he would not be able to carry the special help needed in caring for and training the stock. Must he relinquish the idea altogether? Not necessarily.

Suppose there be such an establishment in the neighborhood. He may buy a mare that will be likely to nick with the stallion, and thus commence in a small way. The care and training of the colts will give him practical experience, information and instruction. In the meantime he must read and study the anatomy and physiology of the horse, in order to become accustomed to a knowledge, at sight, of what a horse probably may accomplish,



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from his appearance. If he cannot, or will not, he had better leave fine horse breeding alone. He will "get left." The same advice will apply in the breeding of any animal. It is a careful and daily study that marks the successful from the unsuccessful man in any path of life. The farmer may, indeed, plod along and make a living, and not know much about his business. It is because nature has been so bountiful in what lies in the soil. The successful farmer and the successful breeder is he who trusts nothing to chance, but carefully considers every point to be made from the best experience and information obtainable.

SECTION IV.—DOUBLE TEAMS.

The matching and training of double teams is not always certain to end as was at first hoped. In this the person who succeeds must be an artist in one sense. He must have an eye for beauty, symmetry, the power of sizing up two animals, and detecting any incongruity between the two as to temper, gait, stamina, size, form and color. These characteristics are important in the order named.

In certain classes of matched horses it is not important that the color be alike, on the contrary it is important that the color be dissimilar. It is, however, important in every class of matched horses, or in every double team, that the temper be alike, or as nearly so as possible. Then the nearer you approach the other requisites the more perfect your team. In the team for mere labor the important qualifications are that the strength and gait of the animals be nearly alike. This, with a similarity of temper, makes the perfect team for draft. This should be sufficient to indicate our meaning in this direction.

SECTION V.—SINGLE DRIVING HORSES.

In the care and training of single driving horses, not only must elegance and style be kept in view, but the temper of the animal should be of the finest quality. Single driving horses are sought by wealthy persons for family use. The horse must have courage, else he is not safe. A nervous, narrow headed coward is never safe, a high couraged animal may be made safe anywhere. They may be trained to depend implicitly upon the will of the driver. This rule will apply to all horses of every class, but especially to all horses driven singly. In double teams the timid horse will in time come to depend upon a high couraged mate. The single

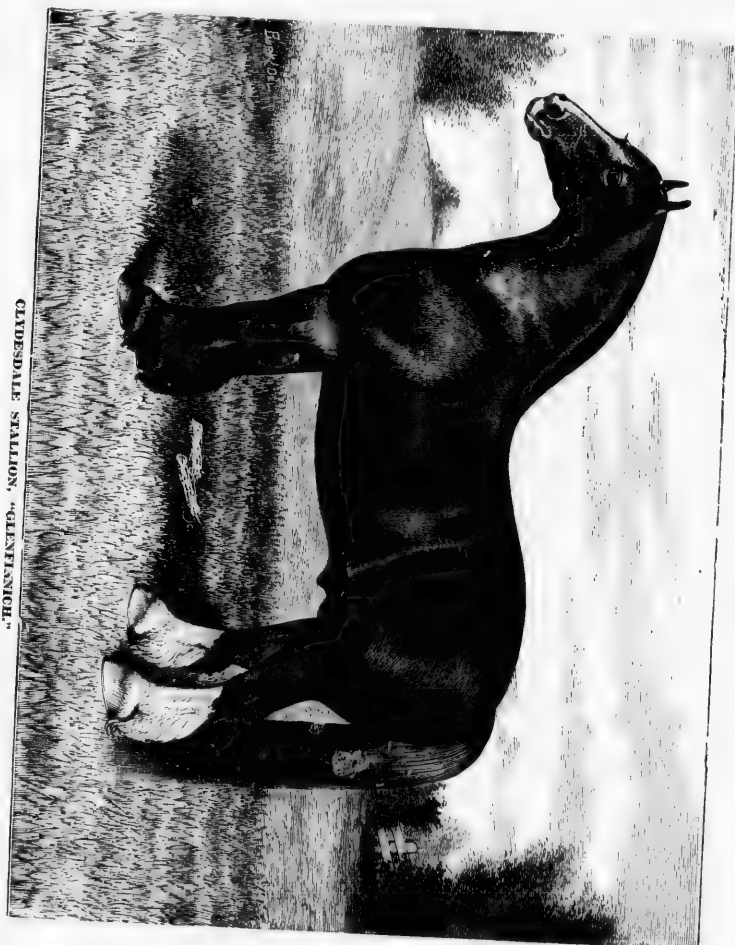
horse must depend upon the driver. A study of heads and limbs given further on will greatly assist the trainer in these essential qualifications.

SECTION VI.—FAST TROTTING HORSES.

No animal can ever be made to trot fast and well at all times, until he comes to know his driver and becomes also entirely subservient to his driver's will. This subservience must not be the result of cruel and brute superiority in the driver. It must be the result of a perfect and mutual understanding between the animal and man. A lazy horse must be kept up to his work. A high, strong, ambitious horse must be kept cool. The tones of the driver must be well understood by the animal. The man who has an intuitive faculty for driving always brings the best exertion out of a horse, without undue excitement of the animal. If the driver does not have this faculty naturally he must acquire it by study, observation and practice. In the preliminary training of the colt the future usefulness of the animal is laid. Whatever the use to which a horse is to be put, this labor will not be thrown away. The sagacious horse buyer is always ready to pay for this preliminary work. It consists in rendering the young animal entirely subservient to the will of the master, and to depend implicitly upon his superior intelligence.

SECTION VII.—A HORSE OF MANY USES.

This preliminary training will result in rendering the horse fully tractable before the real training for work begins, and making him a horse capable of many uses. A general purpose horse is an anomaly. There is really no such thing. His life work must be in some one or two general directions, for heavy, light, slow or fast draft, for practical labor or for speed. Yet a horse may nevertheless be a horse calculated for a variety of work. The active farm team may carry the family for a pleasure ride or draw the family carriage to church. It must, in fact, be a team of many uses. Its adaptability to these uses would not necessarily render it a perfect team for light driving, the city pleasure carriage or the trotting ring. Such would certainly not be horses superior for the saddle or the running turf. The question, then, of adaptability to the requirements must always be the important one in breeding. The elaboration of any one of these subjects would require a large volume of print elaborately illustrated. Our aim is to suggest the direction to



CLYDESDALE STALLION, "GLENHINCH."

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be pursued. The intelligence of the individual must be relied on to pursue the direction carefully, once he has decided upon this definitely.

We shall, as we proceed, give information in definite channels to present a careful study of principles.

CHAPTER V.

DRAFT HORSES.

SECTION I.—CLYDESDALES.

The Clydesdale is represented by English authors as intermediate in size between the Suffolk and the dry-horse, but more active than either. It is supposed to be bred from a cross of the Dutch or Flemish horse, about 1692, with the active descendants of the pack-horses, which were retained in use longer in the north than in the south of Great Britain. He has an extremely neat head, a light neck and a round middle-piece, which is nevertheless very deep in the girth-place. A well-shaped horse of this breed, though higher than the Suffolk, appears to be on shorter legs, and may be from sixteen to sixteen hands two inches high. The long stride, which is characteristic of the breed, is partly dependent upon their greater length, and partly upon habit and training. These horses were said to be able to draw heavier loads in single carts than any others, and hence they were specially adapted to that kind of work which prevails throughout the lowlands of Scotland, where the Clydesdales are employed. A great many inferior animals were formerly bred, which were objectionable from their light bodies and long legs, but these faults are now comparatively rare, great attention having been paid to the breeding of the Clydesdale horse of late years. Large importations are now being yearly made of the best English stallions into the West.

POINTS OF THE CLYDESDALE HORSE.

The "Clydesdale Stud Book" contains the pedigrees of stallions foaled since 1810. So the fancier of this admirable horse need have no fear but that there is plenty of record of sires extending authentically back for three-quarters of a century. We have already stated wherein their general excellence lies, and the standard for judging given below will enable the Clydesdale fancier to correctly estimate them, when taken in connection with the general points of the horse, elsewhere illustrated and figured.

The points for judging Clydesdales will be found in the following, one hundred points being perfection:

Pedigree—No horse being desirable as a sire unless well bred	8
Size—Medium and blocky most desirable	3
Symmetry—Perfection and form	7
Style and carriage	5
Action—Lofly, free, bold, square gaited and a rapid, elastic walker	7
Color—Dark bay or brown, without objectionable marks	7
Head—Broad between the eyes, good brain, clear cut, not too large nor nose too Roman	4
Eyes—Large, full, clear, bright, cheerful, spirited	5
Ears—Medium size; thin, clear cut and shapely	3
Neck—Light and round near the head, good throatle, tapering, arching and well set on the shoulders	3
Chest—Broad, deep, full, denoting good lung power	5
Girth—Large and full about the heart	2
Barrel—Round, good length and full at flank	5
Back and loin—Short, broad, well coupled	7
Rip—Broad, long, with proper shape; tall well set	3
Side—Broad, deep, muscular	2
Hamble—Broad, clean, cordy, not too straight	6
Limb—Hard, smooth, clean, flat; broad bone, of fine quality, and fringed with silky hair on back side to knee and hams	10
Feet—Solid, good depth, tough, solid shell, good frog, not flat	6
Temper—Docile, kind, cheerful, but spirited and resolute	5

100

SECTION II.—ENGLISH SHIRE HORSE.

Within the last few years the English Shire horse has attracted attention in the west. They are larger than the Clydes, the mares going up to 1,850 pounds, and the stallions still heavier.

They are, in fact, one of the modifications of the English cart or heavy draft horse, the name Shire having been lately given it by the Royal Agriculture Society. The cross-bred Shire is a union of Clydesdale and the English draft or Shire horse.

SECTION III.—ENGLISH CART HORSE.

The old English black cart horse is undoubtedly the foundation upon which the Shire horse has been built, as well as the other heavy breeds of draft animals in England. The Lincolnshire is a cross between the black horse of England and the Flemish, which, indeed, figures in the draft horse of every European country and of the United States. The Suffolk and Clydesdale also share prominently in an original way with this Flemish blood. In fact, the Suffolk and the Cleveland Bay now only exist in England in the improved and modified form. The old English cart horse is thus described by Stow henge: "From time immemorial this country has possessed a heavy and comparative misshapen animal, the more active of which were formerly used as chargers or pack-horses, while the others were devoted to the plough."

IMPORTED ENGLISH SHIRE STALLION.



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time wore on, to the lumbering vehicles of the period of Queen Elizabeth and her immediate successors. In color almost invariably black, with a great fiddle-case in the place of head, and feet concealed in long masses of hair, depending from misshapen legs, he united flat sides, upright shoulders, mean and narrow hips, and very drooping quarters. Still, plain as he was, he did his work willingly, and would pull at a dead weight until he dropped. This last quality was necessary enough at the first introduction of wheel carriages, for the roads were so bad that the wheels were constantly buried up to their naves in the deep ruts in the roads at the bottom of every hill, or wherever there was not a clear course for the water to run off. True pulling was therefore considered the first and most essential attribute of the cart or heavy carriage horse; and as without it the traveler or carter would be constantly left in the 'Slough of Despond,' it is not to be wondered at that such was the case."

In conclusion, we may add that the old cart horse of the English and the Flemish horse of the continent have well filled their place in the modification of modern draft breeds, and as such their history will always be interesting.

SECTION IV.—THE NORMAN-PERCHERON HORSE.

The horses of France and their characteristics in the early part of the century, have been carefully portrayed by various writers. The Norman charger is described by French writers as having a fine up-standing crest and head united to a frame of the most massive proportions, molded in a form as elegant as is consistent with his enormous power. Even the diligence horses of many parts of France are of very handsome frames, and their legs and feet are so sound that they are able to trot over the paved roads at a pace which, slow as it is, remarks an English authority, would speedily lame our English horses of similar size and strength. Their tempers, also, are so good that the stallions may be used together with the mares in all kinds of work, and although vice in its various forms is not altogether unknown, yet it is comparatively rare.

The Limousin is chiefly used for the saddle, and is supposed to be descended from horses of the eastern breeds introduced by the Crusaders. He was not, however, in high request until the invention of gunpowder caused heavy armor to go out of use, when a lighter horse was required, and the old

heavy animal bred between the Flemish and Norman cart horse went entirely out of fashion.

The true Norman horse is large, powerful, sufficiently active and very hardy. He has, however, the disadvantages of a heavy head and long cannon bones. The valley of the Meuse is supplied with a small, active horse, generally of a roan color, with strong limbs, clothed with an abundance of hair, and a large, heavy head. The Lingone horse, in the valley of the Marne, is still smaller, with lop ears, drooping quarters and cat hams, which latter qualities enable him to display the activity and sure-footedness of the goat in scrambling over the rough mountain passes bounding the district. Lastly, the Barrois variety, in the valley of the Arne, is a mere pony, but makes up for his want of size by his agility, hardiness and good temper.

FRENCH HORSES IN THE UNITED STATES.

Of late years French horses in the United States have been divided into two classes, the Norman and the Percheron; the former to denote the heavier and the latter the lighter and more active. Whatever may be the end of the controversy, it seems hardly probable that the respective advocates will ever come close enough together to agree upon one general name. In fact, both the Norman and Percheron, so called, are not especially distinct. They are without doubt the peers of any other draft horse in the world. In the west, however, excessively heavy horses are not sought, except for the heaviest draft in cities, and here the excellent pavements are against the use of great, slow horses. This is also true now in England and France. Hence the popularity in America of the Clydesdale and the modern French, Norman, Norman-Percheron or Percheron, as they are indifferently called.

MR. KLIPPART ON FRENCH HORSES.

That very acute and accurate observer and practical writer, the late Mr. Klippart, for many years and up to the time of his death Secretary of the Ohio State Board of Agriculture, after an extended tour of Europe, in writing upon French horses, upon the subject of the "Percheron horse" states that the Perche, the locality in which this race of horse originated is comprised in the former Orleansais, and is located in the center of four departments, which concurred in the formation of the circumscription of the depot at Bonneval. The territory was taken as follows:

from L'Orne, the arrondissement of Montague, and a part of Alençon; from Eure-et-Loire, the arrondissement of Nogent-la-Ratrou; and a fraction of those of Chartres, Dreux and Chateaudon; from Sarthe, a large portion of the arrondissements of the Momers and of St. Calais; from Loire and Cher, finally an important fraction of the arrondissement of Vendôme. Percheron is therefore in Normandy, Beauce, Main and Vendôme. This area forms an ellipse of one hundred kilometers in length and about eighty in breadth, bounded on the north by Normandy, on the west by Normandy and Main, on the east by the Chartrain country and that other portion of Beauce called the Dunois, and on the south by Orleans proper. In relation to the Percheron horse and his recent origin or formation, Mr. Klippart says:

"It is, in every sense of the word, an artificial or fictitious product, and is not a type, as has so frequently been asserted by writers and repeated by others. It is no longer a pure race, as has often been stated, because it has neither antiquity nor homogeneity. During the past fifty years it has received many very important modifications, due to the mixtures or crosses with very different varieties; and there are great changes being produced on it at this moment. The most complete, and at the same time the most precise, definition which has been given it is this one: *The Percheron is a gray horse*. In fact, everywhere in Perche every gray horse is called a Percheron. Every year thousands of fillies are brought there from Bretagne, a very great number, undoubtedly the offspring of Boulonnais; from Flanders and from Picardy, where three very distinct varieties of heavy and powerful draught horses are bred and reared. Then there are the offspring of mares in the country, the progeny, as already stated, of very diverse stallions. From such a diversity and disparity of elements no pure race can be produced which shall be homogeneous in appearance and transmit its qualities with certainty to its offspring. In a word, these cross or diverse bred horses have the power or faculty of constancy in reproduction in so very slight a degree that nowhere do we find the form and exterior characters corresponding with the reputed aptitudes and specific qualities any more than if an attempt had been made to produce them anywhere or everywhere in

any part of France or elsewhere with any strain or race of horses.

Mr. Klippart's description of the Perche horse is as follows:

"The small or light Percheron, such as is employed in the post-chaise or diligence, is a horse of from 14 hands 8½ inches to 15 hands 3 inches high, and is a little high in the thighs. Viewed in front the head is sufficiently square and well turned. When examined in profile it appears rather long, narrow and flat. The eye is small, inserted under a large arch; the ear is small, tapering, and almost always has the appearance of carelessness in its position; the neck is short, straight, slender; the protuberance of the withers generally sufficiently developed to be perceptible. The shoulder, notwithstanding its strength, is straight and short, yet is rather flat. At birth the fore arm is weak. The loin is large and well supported, indicating great power. The croup is heavy, sometimes a shade higher than the withers; at other times it falls below the withers, and in such case the tail seems to be badly set. The buttocks are muscular, but do not descend sufficiently low down. The thigh, on the contrary, is rather long and slender. The limbs are bony, but rather short jointed. The hoof is always good. The body is ordinarily well made, and of as round a form as those of the choicest races. Nevertheless the chest does not present a desirable amplitude; it does not present the full dimensions which render the Norfolk trotters so powerful, and which, by the way, very strongly resemble the Percheron both in structure and aptitude."

SECTION VI.—THE FLEMISH HORSE.

Since the Flemish horse has exerted so important an influence on the modern draft horse and even upon the thoroughbred horse of England, a short description condensed from the observations of Stonehenge will be interesting: "The Flemish horses have long enjoyed a high reputation, and to them we owe many useful crosses among our dray and heavy agricultural draft horses. Both their light and heavy breeds are remarkable for high crests, small heads, somewhat narrow across the eyes, heavy shoulders, and round, powerful, but very drooping quarters. Their hocks are comparatively small but clean, and their legs light and free from hair. Their worst point lies in the feet, which almost always have flat and thin soles, unfitting them

for fast work on hard roads. Just prior to the introduction of railroads the English system of coaching was introduced into Belgium, and I have sat behind several teams of mares drawing a heavy diligence more than ten miles within the hour. Almost all were bay with black points, and their legs were nearly as clean and free from hair as those of our thoroughbreds. They were extraordinarily good-tempered, and suffered their attendants to 'put them to' altogether, being all attached to a splinter-bar, which was turned over the quarters of the wheelers. All that was necessary was to pull up nearly close behind the four horses standing ready for the change, then unhooking the bar of those just come in it was turned over their quarters, and they were taken forward till they cleared the pole, when they were in a body turned on one side. The four fresh horses were then quickly backed to their places, a wheeler passing on each side the pole, the bar was dropped to its place and hooked, the reins in the meantime being taken out of the terrets by the coachman, and the change was effected in less than a minute."

SECTION VII.—MODIFIED DRAFT HORSES.

The future work horse of the United States will be—is, in fact, now—a modified draft horse, as the English understand the term. The Vermont draft horse, now extinct as a breed, but one of the noblest of American work horses, was the produce of Clydesdale blood upon the mixed race of New England. The Conestoga horse of Pennsylvania was the result of the impress of German and Flemish draft blood upon the mixed race of Pennsylvania. Good as either of these were, a very few years will see generally diffused over the west one of the noblest of draft horses, the impress of Norman, Percheron, Clydesdale and English Shire horses upon our better bred mares of mixed blood. The original breeds will undoubtedly be kept pure, but the composite breed, when generations enough have elapsed, will have perpetuated their better qualities, while some disabilities, especially beefiness, will have been eliminated by the peculiarities of the soil and climate.

CHAPTER VI.

DRAFT AND SHOW TEAMS FOR CITIES.

SECTION I.—TRAINED TEAMS.

In cities there will always be a demand for showy draft teams of fine training and perfect match. The

day has passed for elephantine teams whose only power was "beef power" to move a load. The state of modern city necessities does not require them, and for country use they are too clumsy and unwieldy. Handsome, active horses of sixteen to sixteen and a half hands high, of 1,400 to 1,600 pounds weight, thoroughly matched as described on a previous page, is indeed what will now bring the highest possible price, even reaching \$1,000 to \$1,200 the span. The training of any team or single horse is not complete when it is taught to start as bidden, to stop upon the given signal, and to pull steadily at the plow and farm wagon. These are simply preliminary to the real training for city use. The horse must be trained to be perfectly tractable, safe and obedient under any and all circumstances and surroundings. This is only gradually accomplished and under the guidance of one who has made the horse, his ability, disposition, and natural traits, a special study. Hence if the farmer has not done this, he had better sell his likely six or seven year old team, if he has others coming on, to those able to complete this education in another year's use.

SECTION II.—REQUIREMENTS FOR CITY TEAMS.

The show teams, whether for heavy or medium draft, must be able to start a load in a methodical way; must exert themselves evenly, and without springing or jumping; must not refuse a dead pull, no matter how many times bidden to draw. They must be accustomed to every sight or sound they may meet; they must be taught to stand quietly under any and all circumstances, in whatever position they may be placed; they must be capable of being driven through crowds intricate places, about locomotives or where other unusual sounds are heard, and without fear; and they must be sound and without vice. If they possess these qualifications and have great strength they will bring from \$500 to \$800 the span if fairly matched and have ordinary style. If to these practical qualifications they are exceedingly well matched, and have extraordinary style and carriage, there is scarcely a limit to the price that may be gotten for them up to \$1,500, if every way perfect. The same rule will apply to all other classes of fine city teams, but as the draft labor required decreases, the more exalted becomes the price, for then speed, style and action become the more important integers.

SECTION III.—THE CLEVELAND BAY AS A MIRE.

For all purposes of heavy draft, the Clydesdale, the Shire horse, and the Percheron-Norman will present the best qualifications as sires. For the lighter and more elegant classes of draft, the Cleveland Bay will be indicated. The Cleveland Bays are entirely bay, have fine action, high crests, are smooth, clean-limbed, and of elegant style. It must be remembered that the old breed of Cleveland Bays is extinct, even in England. But there is a class of horses bred up from them, and by other crosses, that have produced horses uniform in color, and that now furnish the elegant teams so often met with in England as fine coach horses and for other showy work.

In fact, if staunch thoroughbreds, having style, size, and weight, but perhaps too slow for fast work on the turf, are stunted to large, handsome, speedy, roomy mares, they will get this class of horses; but since the old Cleveland Bay was prepotent in color, bone and muscle, would it not be better for us to begin where the English now are, rather than to build up from where they began some generations of horses ago.

o. Frank Forester, in his large work, "The Horse of America," relates how this was accomplished as follows: The first gradation, when pace became a desideratum with hounds, was the stinting of the best Cleveland Bay mares to good thoroughbred horses, with a view to the progeny turning out hunters, troop-horses, or, in the last resort, stage-coach horses, or, as they were termed, machiners. The most promising of these half-bred colts were kept as stallions; and mares, of the same type with their dams, stunted to them, produced the improved English carriage-horse of fifty years ago.

The next step was the putting the half-bred fillies, by thoroughbreds out of Cleveland Bay mares, a second time to thoroughbred stallions; their progeny to become the hunters, while themselves and their brothers were lowered into the carriage-horses; and the half-bred stallions, which have been the getters of carriage-horses, were degraded into the sires of the new, improved cart horse.

From this, one step more brings us to the ordinary hunter of the present day, of provincial hunting counties, for light weights, and persons not willing or able, to pay the price of thoroughbreds. These are the produce of the third and fourth crosses of thorough blood on the improved mares, descended in the third or fourth degree from the Cleveland Bay

stock, and are in every way superior, able and beautiful animals, possessing speed and endurance sufficient to live with the best hounds in any county, except the very fastest, such as the Melton Mowbray, the Northamptonshire, and, perhaps, the Vale of Belvoir, where the fields are so large, the land all in grass, and the scent so fine, that fox-hunting in them is in fact steeple-chasing; so that no fox can live before the hounds on a fine scenting day above half an hour, nor any horse, except a thoroughbred, live even that time, with the hounds, having fourteen stone or upward on his back.

No sort of breeding in England is so profitable as this. The breeder is comparatively secured against anything like ultimate loss, while he has a fair chance of drawing a capital prize, in the shape of a first-rate hunter or a carriage-horse of superior quality; and it is to the breeding of such a class of animals that the attention of the farmers, in horse-breeding counties, is wholly directed at this date.

For this reason one has no more pure Cleveland Bays, the use of the stallion of that breed being entirely discontinued; large, bony, slow thoroughbreds of good form and great power, which have not succeeded on the turf, having been substituted for them, even for the getting of cart and farming-team horses; and the farmers finding it decidedly to their advantage to work large, roomy, bony, half or two-third bred mares, out of which, when they grow old, or if by chance they meet with an accident, they may raise hunters, coach horses, or, at the worst, chargers, or machiners, rather than to plough with garrons and weeds, the stock of which would be valueless and worthless, except for the merest drudgery.

WEIGHT CARRIERS.

We in the United States do not hunt with "horse and hounds," but we do require staunch saddle horses, fit to carry weight. We require carriage-teams and other elegant double teams, for medium and light draft. The Cleveland Bay of the present day will furnish them; and hence we have said, in relation to all superior stock, it is better for the American farmer to begin where other countries, having superior horses, now are, than to commence where they began.

SECTION IV.—HEAVY DRAFT FOR CITIES.

It is evident that there are not enough heavy draft horses to supply the yearly increasing want in cities. The city horse does not average a life of more than four

years of labor, allowing them to begin their work at from six to eight years of age. The stock must be constantly replenished. There has always been a scarcity of superior horses for strong teams. Hence the impetus of late years in the direction of strong, stylish sires for stallions. We have traversed the world to find such horses. It has given us many excellent ones, yet with our increasing wealth, prices still advance. Shorthorns have been bred in this country for generations. The importations still continue. Look at the constant bringing in of superior stock in other directions. Shorthorns still hold their price. They have added hundreds of millions to the wealth of the country. So have other breeds, yet there is no danger that the demand will ever cease. The day when weedy horses will pay the farmer has gone by. There is no profit in them. He must now begin to breed distinctively in the precise line wanted.

SECTION V.—LIGHT DRAFT HORSES IN CITIES.

The great bulk, however, of horses, either for the city or country, must be horses of light draft. The handsomer they are bred the better they will sell. They will be produced from just such horses as the better class of farmers work on their farms; horses of fifteen to sixteen hands high and weighing from 1,100 to 1,300 pounds each. This will fill the range of all light draft horses. Those heavier will come under the head of heavy draft horses. The best pulling team we ever saw was a pair of sixteen-hand horses, weighing 2,500 pounds. They were well matched, well bred, and well trained. We saw them move a load of four tons up a considerable incline to reach a bridge. They were stopped before they reached the crest, and started again as true as steel. We saw one of them "snake" the hammer of a pile-driver, weighing two tons, on a warehouse floor. That is what we mean by training. The team must be trained for the labor to be performed. The driver must be trained. There are fully as many balky men as balky horses, and more brutal drivers than naturally vicious horses. In fact, the horse, like the man, must be a creature of education.

CHAPTER VII.

SOME FACTS ABOUT BREEDING.

SECTION I.—VARIATION FROM CHANGED CONDITIONS.

The progress of horse breeding received little or no special impetus since the time of the Greeks and Ro-

mans until within the last four centuries. The last one hundred years has shown greater progress than in all other time since the most ancient civilization. The march of civilization and the full settlement of the various temperate and colder regions of the earth, has required modified forms of domestic animals. As showing how quickly animals adapt themselves to changed conditions we reproduce a condensed statement made from various studies more than thirty years ago, which gives the whole thing in a nutshell. It will convey valuable suggestive information. An English observer stated that the London dray horse conveyed to Arabia and subjected to the same influences as the native horse of that country is exposed, in the course of a few generations he will present the leading characteristics of the Arabian horse. The head will gradually diminish in size, the limbs will become fine and clean, the massive proportions of the whole body will disappear, and not only will the external form of the native be acquired, but, aside from this, something of the chivalrous disposition or spirit. Again, if the race thus improved be conveyed back to the central or northern parts of Europe, it will gradually deteriorate, and, in the course of some generations, will assume all its original proportions. These facts would tend to prove that the Arabian horse cannot long exist in perfection in the cool, humid climate of Britain; and the influences arising indirectly from that cause are regarded as the principal reasons of the change. It has also been ascertained that the large coach horses of Leicestershire, in England, when carried to some parts of Yorkshire, where the pasturage is more sparse, degenerate and become small; and that the "Pad" and saddle horses of the last named county, when brought to Leicestershire to breed, change into a fleshy animal with large heavy limbs.

SECTION II.—VARIATIONS IN ANIMALS BY EXTERNAL INFLUENCE.

There is also another class of interesting facts connected with this variation: If sheep are carried from either of the temperate zones to the burning plains of the tropics, after a few years, material changes take place in their covering. The wool of the lambs, at first, grows similar to that in the temperate climates, but rather more slowly. When in a fit state for shearing, there is nothing remarkable about its quality, and, when shorn, it grows out again as with us; but, if the proper time for shearing be allowed

to pass by, the wool becomes somewhat thicker, falls off in patches, and leaves underneath, a short, close, shining hair, exactly like that of the goat in the same climate, and wherever this hair once appears there is never any return of wool. Numerous facts of a similar nature have also been observed in other animals. For instance, in the Cashmere goats which have been brought down from the mountains of Thibet to Kanour, in British India, where the mean annual temperature is but sixty-five degrees Fahrenheit, the down, or underwool, of their wool, that grows in colder climates directly under their fine, long, silky hair, wholly disappears the first year.

In pursuing the subject still further, it may be stated, that the horned cattle originally taken to the Pampas, beyond Buenos Ayres, by the earliest Spanish settlers, have undergone a most singular modification of the bones of the head, consisting of a shortening of those of the nose together with the upper jaw. This race, or breed, called *niata*, externally appear to hold a similar relation to other cattle that the bull-dog does to other dogs, their foreheads being very short and broad, with the nasal end turned up, and the upper lip much drawn back; the lower jaw projects beyond the upper, and has a corresponding upward curve, in consequence of which the teeth are always exposed to view. From their very open and high-seated nostrils, short heads, and protuberant eyes, when standing or walking, they assume a most ludicrous, self-confident air. It may further be remarked, that their hinder legs are rather long, when compared with the foremost ones, which adds to their awkwardness, by bringing their heads near to the ground.

If allowed to lie out in the open air, during the winter of a cold climate, the horse acquires a long shaggy coat; but, if kept in a warm stable, and particularly if clothed, he retains his usual short and sleek summer coat. Sensible differences are also observable from the effects of castration. On the authority of a veterinary surgeon of the British army, who practiced ten years in India, it appears that the hair of the horse, when emasculated in cold weather, ever after is rough, and changes from a stiff, uniform calibre to one that is irregular and fine. It also increases in numbers as well as in length. The hoofs afterward, he says, become more solid and firm.

SECTION III.—OPPOSITE CHARACTERISTICS BETWEEN HORSES AND CATTLE.

The horse breathes through his nostrils only, and not through the mouth; for, in the severest exercises, the mouth is never seen open, unless the lower jaw be violently pulled down by force of the bit. This accounts for the great dilation of the nostrils during and after running. When feeding on natural herbage, he grasps the blades with his lips, by which they are conducted between the incisor or front teeth. These he employs for the double purpose of holding and detaching the grass, the latter action being assisted by a twitch of the head. The ox, on the contrary, uses the tongue to collect his food; that organ being so directed as to encircle a small tuft of grass, which is placed by it between the incisors and an elastic pad opposite to them in the upper jaw; between these the herbage is pressed and partly cut; its complete severance being effected by tearing. The sheep gathers its food in a similar manner as the horse, and is enabled to bring its cutting teeth much nearer to the roots of the plants, in consequence of the upper lip being partially cleft, which is susceptible of considerable mobility; while that of the ox is thick, hairless, and of a very limited action.

When prostrate on the ground, in getting up, the horse rises first on his fore-legs, and completes the operation by elevating his hinder parts. The ox, on the other hand, rises first on his hind-legs, then remains a short time upon his knees, until his hind-legs are straightened, immediately after acquiring a standing position.

SECTION IV.—NATURAL CHARACTERISTICS OF THE HORSE.

Horses differ in intelligence, disposition and temper. Horses with rather small than large ears, placed not too far apart, erect and quick in motion, indicate both breeding and spirit; and if a horse is in the frequent habit of carrying one ear forward and the other backward, especially if he does so on a journey, he will generally possess both spirit and endurance. The stretching of the ears in contrary directions shows that he is attentive to everything that is passing around him; and, while he is doing this, he cannot be much fatigued, nor likely soon to become so. It has been remarked that few horses, in the field, sleep without pointing one ear forward and the other backward, in order that they may receive notice of the approach of objects in any direction. Dr. Arnott says that "when horses or

mules march in company at night, those in front direct their ears forward; those in the rear direct them backward; and those in the center turn them laterally, or across; the whole troop being actuated by one feeling, which watches the general safety." The temper is more surely indicated by a motion of the ear than of the eye; and an experienced observer of horses can tell by the motion of their ears all that they think and mean. When the horse lays his ears flat back upon his neck, and keeps them so, he is most assuredly meditating mischief, and the bystander should beware of his heels or his teeth. In play, the ears will likewise be laid back, but not so decidedly, nor so long; a quick change in their position, together with the expression of the eye at the time, will distinguish between playfulness and vice. The hearing of the horse is remarkably acute; a thousand vibrations of the air, too slight to make any impression on the human ear, are readily perceived by him. It is well known to sportsmen that a cry of hounds will be recognized by the horse, and his ears will be erect, and he will be all spirit and impatience, a considerable time before the rider is conscious of the least sound. The eye of the horse is also a pretty accurate index of his temper; and experience has shown that, if much of the white of the eye is seen, he is a dangerous one, ever slyly watching for opportunities to do mischief; and the frequent backward direction of the eye, when the white is most perceptible, is only to give sure effect to the blow which he is about to aim.

Like the dog, the horse often becomes indissolubly attached to the habits and manners to which he has long been accustomed. He delights in the noise and tumult of arms, and faces the enemy with alacrity and resolution. Equally intrepid as his master, he encounters danger and death with ardor and magnanimity. But it is not in perils and conflicts alone that he willingly co-operates with his rider; he likewise participates in human pleasures. He excels in the tournament and in the chase; his eyes sparkle with emulation in the race-course. But, though bold and intrepid, he suffers himself not to be carried off by a furious ardor; he represses his movements, and knows how to govern and how to check the natural vivacity and fire of his temper. He not only yields to the hand, but seems to consult the inclination of his rider. Uniformly obedient to the impressions he receives, he flies or stops, and

regulates his motions entirely by his master's will. In a measure, he renounces his very existence to the pleasures of man. He delivers up his whole powers; he reserves nothing and often dies rather than disobey. These are features in the character of the horse, the natural qualities of which have been perfected by art, and trained with care to the service of man.

SECTION V.—TRAINING VS. BREAKING.

The time is fast passing away when it was considered necessary to subdue the horse by brute force. Then the process of rendering an animal subservient to the will of man was properly termed breaking. In thus subduing the horse, the animal, not seldom, in its struggles gets the upper hand. Thereafter he is only valuable for the tread-mill, or else the string team where other horses who have been thoroughly broken in spirit assist to render the brute as slavish as themselves. A wider intelligence has shown wiser methods, and we now use the better word training, a word distinctively American.

We make the "colt the friend of the family." They are petted and fondled, accustomed to all the sights of the farm and road in infancy. Their real education commences when they are weaned. Education advances with their growth. They are first trained to walk quietly and cheerfully at the end of the halter; to play around the instructor at the end of the tether; to advance and retreat at the word; to lift up the feet at the word of command; to submit quietly to the biting harness; to carry a slight load strapped to the back; to flex (carry) the head to the right, left, or up or down at the proper signal of the reins, the operator standing at the side, or in front, as the case may be.

Thus, when hitched single or double, the colt is really half trained. In fact, all that is necessary is to check the exuberance of the animal, and to instruct in the performance of labor in the easiest way. In plowing, the colt soon learns that the furrow is a guide, whether he be in it or not. The easy guidance of the rein brings him about just at the right place, and it soon becomes as though intuitive with the animal. In cultivating corn, for instance, a well trained team will seldom injure the crop in coming about or in passing astride it. If they have been properly trained, not by pulling them about and whipping, but by patient instruction, they know that the rows are a guide for them

and must not be trodden on. These few illustrations must suffice so far as training for labor is concerned. The whole matter could not be discussed in a hundred pages with elaborate engravings, and would prevent the introduction of matter considered of more value to the farmer.

SECTION VI.—ABOUT DRIVING HORSES.

A friend of ours, some years ago, remarked: "If you study your horse he will study you. We know he will do so whether or no, but if you study him he will study you intelligently. If you are a coward your horse will soon become one. If the driver pulls quick upon the rein when his horse jumps a little one side at anything he fancies he sees, and by that action giving his horse to understand that he is also frightened, the next time the horse fancies he sees anything he will be much more frightened than before, and the driver will pull twice as hard and sudden; and perhaps, to make the matter still worse, hit him a cut with the whip to punish him for what he could not help." He relates an instance of a very pretty mare he purchased at a very low price because her owner was afraid to drive her on account of her skittishness. He commenced by driving her at a very slow gait, and was careful not to let her know that he even noticed her when she shied. The consequence was that she soon became disgusted with her own foolishness and thereafter proved a quiet and docile driver.

SECTION VII.—AN ARAB MAXIM IN BREEDING.

The Rev. W. H. H. Murray was a great lover of the horse, and devoted much time to breeding, training and driving. Here is what he says upon the Arab maxim that the foal follows the sire:

To account for it, in the first place the Arabs always select their dams with great care. Now it may be that the word "best" as applied to their dams you do not apply to yours—that is, the dam that you would consider the best may not be the best in the eye of the Arab breeder. What is the best dam in the eye of the Arab breeder? May it not be the one that will allow its foal to bear the stamp of the horse? I think so. I have two dams on my farm that could not be sold by a religious man for over \$800 in a matter of trade, and yet \$3,000 could not buy either of them. Why? Three colts have come out of them, and every colt has looked precisely like its sire, has put its feet

when eating its oats precisely like its sire, has smelled of the water and muzzled around it before drinking precisely like its sire, has done everything like its sire. The dam simply carried it, as a mother holds her baby in her lap, and never marked it at all. Now may not the old Arabs have such facts in mind? May they not when they laid down the maxim, "The foal always follows the sire," have had this in mind, that there should be no dam bred to a sire that would interrupt the sire in propagating himself? I know a man that has a mare that has foaled two colts. He bought her for \$87, and yet she is invaluable. Why? Because each of the colts that came from her are not only like the sire in a general sense but they are the sire in miniature. In interior habits of the stable, in the way they move about in the stall, the way they toss their heads, and the way they feed and drink, they are the sire over again.

You may take all my fashionable, high-bred mares out of my stable if you will leave in their places such mares as that, for you have eliminated for me in doing it half the difficulty out of the problem of breeding, namely, the difficulty which the temperament, structure and habits of dams bring to the breeder. For instance, I could select an animal that is perfect, one I know is perfect, one that can transmit himself if he is not bothered and interrupted in doing it by the dam. I know I can, I say, select such a stallion in New York, in New England, and in six or eight stables in the Middle States, and if I can find a dam that will not trouble that sire in the offspring I can repeat the sire in every colt. The Arabs may have selected their dams in that way.

How, then, will you see the possibility of this old Arab maxim being true in our practice? First select a dam that will simply carry the foal, feeding it with its blood and milk, but not affecting it at all, and then select a horse that has first the general excellence that you want, then the special excellence, and then the power to transmit both the general and special excellence, and would not the maxim be true that "the foal follows the sire?"

Mr. Murray, in breeding for the market, held that the first great point to be considered is pedigree; second, size; third, color; fourth, health; fifth, temperament; sixth, speed.

CHAPTER VIII.

REQUISITES TO SUCCESSFUL HORSE BREEDING.

SECTION I.—A STUDY OF PRINCIPLES.

The successful horse breeder must have a love for this noblest of domestic animals. He must have intelligent discrimination, either natural or from study, to enable him to correctly estimate the value of a sire or a dam from their outward conformation, coupled with their power, by trial, for speed, draft or other use for which they may be intended. He must have requisite facilities for feeding, lodging and the care of the animals generally. He must carefully estimate the kind of horse best adapted to sale in his region of country, or market, and breed that class. If he can afford to have a hobby and breed for the pleasure of the thing, that is another thing. It is usually a costly pleasure. The principles involved lie more nearly in those connected with generation, than in all else combined. Stonehenge, in the "Horse in the Stable and Field," has given these so concisely and correctly, so far as known, that we here reproduce them as being a capital study. There are sixteen rules, applicable in the whole range of breeding, that may well be committed to memory. These rules are as follows:

SECTION II.—STONEHENGE'S THEORY OF GENERATION.

1. The union of the sexes is, in all the higher animals, necessary for reproduction; the male and female each taking their respective share.
2. The office of the male is to secrete the *semen* in the *testes*, and emit it into the *uterus* of the female, (in or near which organ) it comes in contact with the *ovum* of the female—which remains sterile without it.
3. The female forms the *ovum* in the *ovary*, and at regular times, varying in different animals, this descends into the *uterus*, for the purpose of fructification, on receiving the stimulus and addition of the *sperm-cell* of the semen.
4. The semen consists of two portions—the *spermatozoa*, which have an automatic power of moving from place to place, by which quality it is believed that the semen is carried to the ovum; and the *sperm-cells*, which are intended to co-operate with the *germ-cell* of the ovum in forming the embryo.
5. The ovum consists of the *germ-cell*, intended to form part of the embryo,—and of the *yolk*, which nourishes both, until the vessels of the mother take

upon themselves the task; or in oviparous animals, till hatching takes place, and external food is to be obtained. The ovum is carried down by the contractile power of the fallopian tubes from the ovary to the uterus, and hence it does not require automatic particles like the semen.

6. The embryo, or young animal, is the result of the contact of the *semen* with the *ovum*, immediately after which the *sperm-cell* of the former is absorbed into the *germ-cell* of the latter. Upon this a tendency to increase or "grow" is established and supported at first, by the nutriment contained in the yolk of the ovum, until the embryo has attached itself to the walls of the uterus, from which it afterward absorbs its nourishment by the intervention of the *placenta*.

7. As the male and female each furnish their quota to the formation of the embryo, it is reasonable to expect that each shall be represented in it, which is found to be the case in nature; but as the food of the embryo entirely depends upon the mother, it may be expected that the health of the offspring and its constitutional powers will be more in accordance with her state than with that of the father; yet since the sire furnishes one-half of the original germ, it is not surprising that in externals and general character there is retained a *fac-simile*, to a certain extent, of him.

8. The ovum of mammalia differs from that of birds chiefly in the greater size of yolk of the latter, because in them this body is intended to support the growth of the embryo from the time of the full formation of the egg until the period of hatching. On the other hand, in mammalia the placenta conveys nourishment from the internal surface of the uterus to the embryo during the whole time which elapses between the entrance of the ovum into the uterus and its birth. This period embraces nearly the whole of the interval between conception and birth, and is called *utero-gestation*.

9. In all the mammalia there is a periodical "heat," marked by certain discharges in the female, and sometimes by other remarkable symptoms in the male (as in the rutting of the deer). In the former it is accompanied in all healthy subjects by the descent of an ovum or ova into the uterus; and in both there is a strong desire for sexual intercourse, which never takes place at other times in them (with the single exception of the genus *Bimana*).

10. The semen retains its fructifying power for some days, if it is contained within the walls of the uterus or vagina, but soon ceases to be fruitful if kept in any other vessel. Hence, although the latter part of the time of heat is best for the union of both sexes, because then the ovum is ready for the contact with the semen, yet if the semen reaches the uterus first, it will cause a fruitful impregnation, because it remains there (or in the fallopian tubes) uninjured, until the descent of the ovum.

11. The influence of the male upon the embryo is partly dependent upon the fact that he furnishes a portion of its substance in the shape of the sperm-cell, but also in a great measure upon the effect exerted upon the nervous system of the mother by him. Hence, the preponderance of one or the other will, in great measure, depend upon the greater or less strength of nervous system in each. No general law is known by which this can be measured, nor is anything known of the laws which regulate temperament, bodily or mental power, color or formation of the resulting offspring.

12. Acquired qualities are transmitted, whether they belong to the sire or dam, and also both bodily and mental. As bad qualities are quite as easily transmitted as good ones, if not more so, it is necessary to take care that in selecting a male to improve the stock he is free from bad points, as well as furnished with good ones. It is known by experience that the good or bad points of the progenitors of the sire or dam are almost as likely to appear again in the offspring as those of the immediate parents, in which they are dormant. Hence, in breeding, the rule is, that like produces like, or the likeness of some ancestor.

13. The purer or less mixed the breed the more likely it is to be transmitted unaltered to the offspring. Hence, whichever parent is of the purest blood will be generally more represented in the offspring; but as the male is usually more carefully selected and of purer blood than the female, it generally follows that he exerts more influence than she does; the reverse being the case when she is of more unmixed blood than the sire.

14. Breeding "in-and-in" is injurious to mankind, and has always been forbidden by the Divine law, as well as by most human lawgivers. On the other hand, it prevails extensively in a state of nature with all gregarious animals (such as the

horse), among whom the strongest male retains his daughters and grand-daughters until deprived of his harem by younger and stronger rivals. Hence, in those of our domestic animals which are naturally gregarious, it is reasonable to conclude that breeding "in-and-in" is not prejudicial, because it is in conformity with their natural instincts, if not carried further by art than nature teaches by her example. Now, in nature, we find about two consecutive crosses of the same blood is the usual extent to which it is carried, as the life of the animal is the limit; and it is a remarkable fact that, in practice, a conclusion has been arrived at which exactly coincides with these natural laws. "Once in and once out," is the rule for breeding given by Mr. Smith in his work on breeding for the turf; but twice in will be found to be more in accordance with the practice of our most successful breeders in the founding of distinct breeds or varieties.

15. The influence of the first impregnation seems to extend to the subsequent ones. This has been proved by several experiments, and is especially marked in the equine genus. In the series of examples preserved in the museum of the College of Surgeons, the markings of the male quagga, when united with the ordinary mare, are continued clearly for three generations beyond the one in which the quagga was the actual sire; and they are so clear as to leave the question settled without a doubt.

17. When some of the elements of which an individual sire is composed are in accordance with others making up those of the dam, they coalesce in such a kindred way as to make what is called a "hit." On the other hand, when they are too incongruous, an animal is the result wholly unfitted for the task he is intended to perform.

SECTION II.—BREEDING FOR A PURPOSE.

The practical breeder must breed for a special purpose. That purpose is profit. If profit and passion may run in parallel lines the enjoyment is enhanced. The wealthy person may follow the object of his passion. He can afford to pay for the enjoyment in the particular bent in which his mind leads. The practical purpose of wise breeding, however, is to produce a salable animal. It is not accomplished by covering a valuable mare by some "cross roads" stallion because he is easy of access and cheap. It is not in employing some high caste, and of course, costly stallion, to breed first-class

colts from common, weedy or broken-down mares. It is not after you have gotten the right start in stock, in the wintering of colts on the lee side of a hay stack to make them tough. It never toughened an animal yet. Once you have fixed upon the purpose for which you breed, stick to the line. Do not mix breeds with a view to improving either of them. If you can afford to breed two classes, each one must be kept fully distinct. Do not try to do what so many have failed in—to improve a breed by uniting two dissimilar animals. Breed always within the breed, in breeding up grades from crosses, and especially breed to the line in all pure breeds. In breeding grades breed in-and-in more closely than in breeding pure bred animals, and in the breeding of all stock breed as closely in line as possible.

SECTION III.—THE BREEDER'S ART.

The previous section really pertains to the art of breeding. Now to follow still further, this subject, let us take the physiology of breeding. Mr. S. L. Goodale, secretary of the Maine Board of Agriculture, in "Some Remarks on the Physiology of Breeding," correctly says: We see hereditary transmission of a peculiar type, upon an extensive scale, in some of the distinct races—the Jews and the gypsies for example. Although exposed for centuries to the modifying influences of diverse climates, to an association with peoples of widely differing customs and habits, they never merge their peculiarities in those of any people with whom they dwell, but continue distinct. They retain the same features, the same figures, the same manners, customs and habits. The Jew in Poland, in Austria, in London or in New York, is the same; and the money-changers of the temple at Jerusalem in the time of our Lord may be seen to-day "on 'change" in any of the larger marts of trade. How is this? Just because the Jew is a "thoroughbred." There is with him no intermarriage with the Gentile—no crossing, no mingling of his organization with that of another. When this ensues, "permanence of race" will cease, and give place to variations of any or of all sorts.

Some families are remarkable during long periods for tall and handsome figures and striking regularity of features, while in others a less perfect form or some deformity reappears with equal constancy. A family in Yorkshire is known for several generations to have been furnished with six fingers and toes. A family possessing the same peculiarity resides in the

valley of the Kennebec, and the same has reappeared in one or more other families connected with it by marriage. The thick upper lip of the imperial house of Austria, introduced by the marriage of the Emperor Maximilian with Mary of Burgundy, has been a marked feature in that family for hundreds of years, and is visible in their descendants to this day. Equally noticeable is the "Bourbon nose" in the former reigning family of France. All the Barons de Vessius had a peculiar mark between their shoulders, and it is said that by means of it a posthumous son of a late Baron de Vessius was discovered in a London shoemaker's apprentice. Haller cites the case of a family where an external tumor was transmitted from father to son, which always swelled when the atmosphere was moist. The famous English horse Eclipse had a mark of a dark color on his quarter, which, although not a defect, was transmitted to his progeny even to the fifth generation.

Very curious are the facts which go to show that acquired habits sometimes become hereditary. Pritchard, in his "Natural History of Man," says that the horses bred on the table lands of the Cordilleras "are carefully taught a peculiar pace, which is a sort of running amble;" that after a few generations this pace becomes a natural one, young, untrained horses adopting it without compulsion. But a still more curious fact is, that if these domesticated stallions breed with mares of the wild herd which abound in the surrounding plains, they "become the sires of a race in which the ambling pace is natural and requires no teaching."

Mr. T. A. Knight, in a paper read before the Royal Society, says:

The hereditary propensities of the offspring of Norwegian ponies, whether full or half-bred, are very singular. Their ancestors have been in the habit of obeying the voice of their riders, and not the bridle, and horse-breakers complain that it is impossible to produce this last habit in the young colts. They are, however, exceedingly docile and obedient when they understand the commands of their masters.

If, even in such minute particulars as these, hereditary transmission may be distinctly seen, it becomes the breeder to look closely to the "like" which he wishes to see reproduced. Judicious selection is indispensable to success in breeding, and this should have regard to every particular—general appearance, length of limb, shape of carcass, development of

chest; if in cattle, the size, shape and position of udder, thickness of skin, "touch," length and texture of hair, docility, etc.; if in horses, their adaptation to any special excellence depending on form, or temperament, or nervous energy. Not only should care be taken to avoid structural defects, but especially to secure freedom from hereditary diseases, as both defects and diseases appear to be more easily transmissible than desirable qualities.

One of the great mistakes of those who undertake the breeding of horses (it applies as well to all animals, but is not so fatal to profits) is that once a standard is reached that it may be maintained without difficulty. Suppose we can breed half-bloods, can we maintain the standard of the first cross by breeding half-breeds together? By no means. They will deteriorate. A writer on thoroughbred horses—and the same rule will apply to all breeds—puts it in this way: An error among some breeders is, they seem to imagine that their three-quarters or seven-eighths bred animals breeding together will get thoroughbred foals. Would a generation of mulattoes or quadroons intermarrying continually produce white children? The fact is that constant infusions of the purest blood are necessary, not only to improve all stock, human and equine, but to keep it up to its standard. The service of a thoroughbred cannot be dispensed with for any length of time, or degeneration must surely follow. If we arrive at a desirable point of excellence for saddle horses for cavalry and other uses, it will not do to rest there and breed solely from them. The "sang pur" must be mingled frequently in order to keep the race from deterioration, and so improve it as much as possible. Such is the recent wise decision of the agricultural societies of Great Britain, founded upon thorough research and careful analysis of all the facts possible to be obtained. From these remarks it must not be understood that breeders who wish to improve their horses can do so by picking the worn-out, weedy cast-offs of every and any racing stable. Some writers seem to fancy when the thoroughbred stallion is recommended as a means of purifying the blood of American horses that all thoroughbreds are alike for that purpose. This is simply absurd. When speaking of the cart horse it is by no means meant the rack of bones that staggers in front of the rag man's cart; and when of the blood stallion, it is meant one which has not failed to stand the most

vigorous tests. If our stables are to be replenished by the descendants of English racers the most successful of them should be selected. To produce the thoroughbred all circumstances of feeding, stabling, grooming and general care must tend to encourage the qualities that make the great racer a type of his genus. The real thoroughbred is an animal which shall stand the test of training and racing successfully and can reproduce himself or a better. The vital importance of breeding from the finest proven thoroughbred animals must now be clearly seen, yet after the care and trouble of procuring the true foal, genuine and unblemished, we have accomplished little if we do not know how to raise him in a manner worthy of his high pedigree and mission. It is the easiest matter in the world to spoil good colts by careless or ignorant treatment.

SECTION IV.—THE FARMER AS A BREEDER.

The farmer who is wise will not forego the breeding of horses. He should, indeed, breed all farm animals. He need not necessarily breed full blood animals of any breed, but he should at least breed up—that is, select the breed best adapted to his wants and then use only full-bred sires. He had better send a favorite mare from twenty to forty miles to the proper sire than accept one not correctly in line with the mare without fee. By studying correct principles in a few years he will find his live stock so much improved that the wonder will be why he was blinded so long to his best interests.

The cost of service of a stallion or of the finely-bred bull is not excessive when the outcome is considered. A well-bred boar or ram is within the means of every farmer. You must wait two years for a meadow, and from five to eight for a good orchard; you wait three years for horses and cattle to grow fit for market. You must wait ten to twelve years for an orchard to come to a full bearing age. Can you not wait so long to become the possessor of seven-eighths to fifteen-sixteenths bred horses and cattle? Begin now!

SECTION V.—HOW TO SELECT A MARE.

The selection of the mare is no less important than that of the sire. Whatever the breed, the mare must be roomy—have plenty of belly—and be particularly well developed in the hips. If she is rangy so much the better; but never select a narrow-hipped mare nor one with weak thighs, however handsome otherwise. She should be symmetrical

in form. She should also stand strong and perfect on her limbs. A study of the anatomy and position of limbs, as given further on, will be of special value.

In selecting mares of the mixed blood of the country a type must be fixed upon. In other words, a standard of excellence must be adopted in the mind, and the animal must conform pretty carefully to this. Do not take an inferior standard. Wait until you find your type. Once the mare is found that does come up to the standard do not haggle too long over the price. If it is beyond your means, that is another thing, but do not let a moderate sum prevent your buying.

IMPORTANT QUALIFICATIONS.

The union of a superior animal with an inferior one never resulted in good. Both sire and dam furnish important integers to the young. The axiom is that the influence of the dam is in regard to force, that of the sire in regard to direction. These are influenced by the deep shoulder, the moderate arm, length and muscularity of the forearm, a well defined trapezium at the back of the knee, and well defined sesamoid bones at the upper posterior portion of the fetlock, shortness from the knee down, strength in all bones, capability of mobility in the superstructure. Good shoulders are deep and well laid back in all good horses. Quality in the hind quarters is determined by proportion of parts—loins, thighs, gaskins, hocks. Strong loins, muscular thighs and gaskins, clean, bold hocks, the point of the hock in all cases well defined. We thus have considered the bases of speed, action, endurance. Beauty of proportion and style of movement are features no harness, hack, or speed breeder can afford to despise, and the same holds good in regard to heavy draft horse stock for export.

An up-standing, roomy mare—that is, one with a y fore-hand, a long barrel, well coupled up or ribbed home, wide across the hips, deep at fore and back rib, evidencing length and gentle obliquity, but no droop in the quarter, on short, flat, clean legs—this would be the brood mare of our choice to repay outlay.

It is important to regard constitution in the parentage apart from the essential consideration of size, freedom from hereditary blemish or defect, good, sound legs and feet, a symmetrical body, perfect wind and eye-sight.

SECTION VI.—THE STALLION IN BREEDING.

The matter given in relation to breeding of the horse will apply generally, so far as principles go. The male should always be the superior animal in breeding up, because he gives direction. Then the better the mare the more superior the colt. The most unfortunate thing possible would be that a superior mare should be served by an inferior stallion. It would become especially unfortunate if this should produce the mare's first colt. The impress would probably be a lasting one. If the mare had been a breeder her blood would nevertheless be contaminated, through intercirculation of the blood of the dam and fetus.

If fine stock is to be bred the master cannot be too alert in preventing reckless or foolish stable men and boys from committing mischief in the coupling of animals. The farmer does not want a beefy horse as a sire. He should be sinewy, clean cut, compact, courageous, and teeming with the good points of his particular breed. Compact, eager Percherons; small-sized English draft; Shire or Clydesdales, muscular and active. The thoroughbred should be especially strong and powerful. If trotters are to be bred they should be of large size, full of bone and sinew, and with a strong, far-reaching gait. There is really no more important thing in breeding than the selection of a sire.

CHAPTER IX.

HORSE BARN AND STABLES.

Many breeders and feeders, and a still greater proportional number of farmers, consider the end reached of the barn or stable structure provided it shelters from wind and storm. Yet it is a fact that most diseases of our domestic animals are due to the changed condition experienced through domestication. Barns, stables, sheds and feeding yards where filth is allowed to accumulate are seats of endemic (local) diseases and hot-beds of infection and contagion when epidemic or contagious diseases are rife. If there be bad ventilation and drainage the most costly structure is often more dangerous than simple ones. Ventilation, therefore, and drainage are the important points to be considered in the construction of any building where animals are confined. If a complete structure is to be built the services of an architect skilled in ventilation and drainage should be employed. The general idea of the

owner may be carried out in relation to fixtures and economic arrangement.

The southwest and the west sides of the barn should be protected in some way from the sun and against strong winds by belts of trees and the location should be an especial consideration in the construction of country and suburban stables. In cities and villages the location of the stable is not a matter of choice. The village lot and the city block determine this. On the farm the case is different. Do not, therefore, build the stable, and, as a matter of course, the house, where the ground rises from it in every direction. It will subject man and beast alike to attacks of miasmatic fevers and other derangements of the system, and to aggravated types where, in more open situations, the attacks would be mild. There should be at least a good descent on one side for quickly carrying drainage away; it is better if there be circulation of air from every side. In exposed situations protection is easily arranged by means of windbreaks, by belts of trees. In relation to light, air and ventilation of stables, less than eight feet in height of wall for horses is not admissible; ten feet is better, since in a low stable the vitiation of the atmosphere is more than counterbalanced by the increase of heat from the animal's body. A cool, still air is better than a close, moist atmosphere. It should be dry enough to readily pass off the insensible perspiration, and warm enough to dry a horse easily when sweated, and under the hands of the person who is rubbing the animal. There should also be abundant light by means of windows. These, if tolerably high, may be a part of the system of the ventilation employed. The floor of the stable of whatever material it be made should not soak up the urine.

DIMENSIONS OF STABLE.

The stable should not be less than eighteen feet wide, with the stalls of such length as will allow six feet standing room for each horse, and five feet in width. The walls should be eight to ten feet high. The horses stand in a single row, and the harness is hung on pegs in the wall behind them. This width admits of thorough ventilation to the stable without subjecting the horses to drafts. Each standing should be parted off by an upright post reaching from the ground to the ceiling rafter, placed three feet from the wall at the horse's head. The partitions should be closely boarded up three feet

above the manger and hay-crib to prevent the horses quarrelling about the food and biting each other, or, if not quarrelsome, to each of the posts a bale, ten feet long and twenty inches wide, should be hung by a strong chain to divide the standings, and suspended by another strong chain at the hinder end from the ceiling rafter. Each chain should have a hook and eye within reach that may be readily unfastened. This arrangement will leave the whole space opposite the head of each horse available for feeding purposes.

The manger for grain and chaff (cut feed) may be two and a half feet long. It should be two feet wide at the top, one foot two inches at the bottom. The hay and straw need a larger space, say, three feet six inches long, two feet wide at its upper part and half that width below. It should be so constructed that while it is even with the manger above, it should reach to the ground, two feet above which should be fixed to the wall a bottom, sloping to one foot above the ground in front, where some upright opening should be cut to allow the escape of seeds and dirt. The manger may be constructed of yellow pine, one and a half inches thick for the front, back, and ends; the bottom two inches thick. The top of the front and ends should be covered with half-round iron, two and a half inches wide, screwed on to project over the front, a quarter of an inch outside and three-quarters of an inch inside the manger. This prevents the feed being tossed out and the manger being gnawed. A short post must be put up as near the center of the standing as possible to support the manger, into which a large ring must be put to let the chain or rope of the headstall pass freely up and down without constant friction. The manger may be three and a half feet from ground to top; the hay-crib of course the same height. The paving of the standings to three and a half feet from the head, should be flat, then with a fall from both sides to the center, where an angle iron drain of four inches wide from end to end, with a removable flat iron cover fitted to the inside of it, should be placed straight down the standing, with a falling into another larger cross main drain ten feet six inches from the head, so placed as to carry away the urine from all the smaller drains into a tank outside the stable. This main drain so placed, takes the urine from the stable, and has a loose cover also fitted to it, easily removed for sweeping out when necessary.

SECTION II.—STABLE VENTILATION.

Ventilation in the country is not difficult. There is generally too much, especially in winter. The chief difficulty lies at times in the ability to prevent the admission of too much air, and thus in severe weather cool the apartment excessively, and hence cause sudden checking of animal heat at the surface, because it is carried away faster than the system can supply it. The prevention is such protection to the building that air cannot enter except at the ventilators. In cities more artificial means must be used. Air must be brought down from the top of the building, and generally some means must be used by which a downward pressure of air is obtained. When the atmosphere is in motion, funnel-shaped tops that may be turned to the wind will easily be suggested, and the shaft running through the roof, from its close and continuous length, will usually afford draft enough to keep up a continuous ventilation.

The ventilating shaft, which should not be less than four feet square to where it is narrowed at the exit, may be provided with trap doors at suitable intervals, so it may be utilized as a chute for passing down hay or bedding, and of course should be perfectly smooth inside, and preferably widening at the bottom. The doors should fit tight and always be kept closed when not in use. The doors may be about two feet square, and be hung on hinges to open downward, and when closed may be fastened by a button or similar device.

This is a simple system of ventilation for country stables, whether they may be used for stock alone or in connection with the general barn. If the latter, the floors above the stable must be of planed and grooved plank, driven perfectly tight to prevent vitiated air from entering the fodder above. The best arrangement, however, for stables is, in my opinion, in the form of a lean-to attached. Hence, air may be admitted to the stable either by windows, that may be more or less turned down by means of a slide or ratchet, or by any of the various devices suitable for windows. They thus supply not only air but also light. Yet, whatever the plan of ventilation, valves or checks must be placed both in the shaft, and also the tubes, admitting air to regulate its flow. Admission of air by means of sub-earth ventilation, thus getting air cool in summer and warm in winter, is simply pipes of not less than

six inches in diameter, laid six feet under ground, and not less than 400 feet in length, thus admitting air to the stable, cool in summer and warm in winter.

VENTILATION IN CITY STABLES.

Ventilation in cities really assumes more serious difficulties, especially when they are situated in closely built blocks. Here the air must necessarily be brought from the roof, unless some means are supplied for forcing a current of air. In the case of basement stables, this is absolutely necessary, and, where power is used for other purposes, not difficult. You have but to exhaust the tube below and the air will flow in, and the air shaft will always preserve enough draft to carry off offensive emanations. Which of the two emanations are the most deleterious, those of the excrement, or breath, may be difficult to decide. If the ventilation be sufficient to carry off the one, the others follow as a matter of course. There is no tangible excuse for offense from excrement at least. It is simply a matter of cleanliness. In the case of epidemics or unusual sickness in a stable, the ventilation should be especially looked to. The drainage also must be examined into.

One of the constant mistakes made by architects, especially in the construction of close and elaborate stables, seems to be from ignorance of the amount of air necessary for the welfare of animals. In cities, for instance, the land upon which the building stands is valuable; space must be economized to the last degree; the block is built up solid, and the animals are crowded together as close as they can stand. What would be thought of crowding human beings like this? And yet the same number of cubic inches are necessary to the animal, bulk for bulk, as the human subject.

THE NECESSITY OF VENTILATION.

Let us look into this matter. In health, the horse breathes from ten to twelve times per minute. The ox breathes twelve to fourteen times, and man sixteen to eighteen times per minute. The breath once expired will no longer support life, and will support life only more or less perfectly according to the amount of pure air continually mixed with it. The average man inspires and expires about a pint of air at a time, or 21.66 cubic feet per hour, or nearly five hundred and twenty cubic feet in a full day. A man therefore consumes a cube of air eight feet each

way every day. The horse is eight times larger than man, and should consume over 4,100 cubic feet of air per day, or a cube equal to sixteen feet on every side. The average amount of air to each horse in city stables is, say, $4 \times 12 \times 8$, or three hundred and eighty-four cubic feet, or enough to support life ten hours, if it could be given in four quart doses, fresh at each inspiration, and without contamination with air once breathed. But air containing carbonic acid is heavier than common air. It sinks next the ground, and there remains, unless driven away by an influx of fresh air in motion. Is it singular, therefore, that the horse lying down in a close stall with imperfect ventilation should soon rise through partial suffocation, and prefer to take his sleep standing? If to the natural vitiation of the air we add the nitrogenous effluvia from excrementitious matter, sewer gas and other malaria, the wonder is that horses are not found stark and stiff in the morning in many city black-holes called stables. A stable must be furnished with nearly 200 cubic feet of air per hour, for each horse contained, to supply waste in breathing alone.

Hence we see the absolute necessity of ventilation to a degree few imagine to be necessary, even when the air is dry and pure. That a horse lying down with his head close to the floor, in a confined stall, *must* become distressed in a very short time is not difficult to understand. In fact, he cannot rest lying down, and must, perforce, rest standing up. Yet we have heard persons congratulating themselves that their horses never lie down to rest. Give the stable proper ventilation and see how quickly they will avail themselves of nature's position for sleep in comfort or for rest to wearied limbs.

The temperature of stables in their relation to health is worthy of consideration. The proper temperature is undoubtedly from sixty to sixty-five degrees. If it is possible the stable should never go much below the freezing point. The reason is obvious. It occasions severe loss of vital heat that must be supplied in some way. If the body becomes chilled, many functions are impaired, digestion especially. Bronchial affections, chronic coughs, pneumonia and many inflammatory diseases are apt to arise. If to this is added vitiated air the most serious consequences may arise from blood poisoning, for it is while the animal is in an enforced state of quiescence that complications occur. Exercise

promotes heat, full inflation of the lungs, and the system is enabled to throw off morbid action, and excretion is active. If these disabilities need care to guard against them in health, how much more necessary in actual disease? Hence, the superior results obtained in hospitals or infirmaries where proper temperature and ventilation are easily controlled.

A SUMMARY OF POINTS.

To summarize the chief points in the foregoing we repeat, in the construction of stables with a view to proper ventilation and to secure proper hygienic conditions, not only ventilation must be attended to, but warmth in winter and coolness in summer are essential, for health cannot be economically conserved when the temperature is constantly being seriously altered. Drainage is therefore of essential importance in its relation to health.

In building, attend particularly in the erection of the walls to the means for the admission of plenty of light. Dark stables are the direct cause, especially in connection with want of ventilation, of many serious disorders of the eyes. Try it yourselves. Go suddenly out from a darkened room into the glaring sunshine. If light and air is to be admitted by means of simple windows at the head of each horse, they should be at least two feet above the heads of the horses. The best plan, however, is not to have the light entering directly before the animal. The stable should be lighted with a diffused light, and coming, if possible, from behind. The proper ventilation is, as before stated, by means of air shafts, carrying the air directly to the roof and out of the peak. The incoming air should be by pipes leading from the roof, if it may not be brought from the sides. These may be twenty or twenty-five feet apart, and six or eight inches in diameter—say at the height of a man's head, and so curved that the air will impinge against the walls, and deflect downward. This will cause it to circulate in a fan shape to the floor and become warm before it reaches the animals, and the vitiated air will be carried to and up through the exit shafts. As to the doors, there should be a sufficient number for convenience and for cooling the stable in summer, but both the doors and windows should be so arranged that they may be tightly closed in cold, stormy and windy weather, for at such times there is no difficulty in getting plenty of ventilation.

SECTION III.—STABLE DRAINAGE.

The subject of drainage is of the first importance in its relation to the health of animals confined in stables. Imperfect drainage of stables and yards is one of the most prolific sources of disease also in families. There is no more proper place to discuss this important matter than here. Hence we give the leading points as given in one of the regular lectures, by the author, before the class at the veterinary college at Chicago.

The subject of stable drainage is most intimately related to hygiene in stable management, and it is also one of the most valuable auxiliaries in the assistance it renders ventilation in keeping the air pure. Much may be accomplished by strict attention to the regular and thorough cleaning of stables. It is only half performed when the manure is dumped outside and allowed to accumulate, heat, rot, and poison the air with its fumes. It is still worse if the liquid matter of the stable be allowed to soak the floors, drip through and saturate the earth below, and become putrescent, thus giving rise to the most deadly germs.

A substance perfectly dry does not change, nature does a substance when frozen solid, but these conditions cannot be practically reached. It is under the influence of heat and moisture that organic substances decay. Place any moist vegetable substance in a compact heap; in a short time heat ensues and fermentation is followed by decay. During this process the gaseous elements are set free, and at length nothing remains but charcoal or the ashes, for the process of decay is simply combustion through the absorption of oxygen by the mass consumed. The same operation is as surely going on, but more slowly, in the forest, although it may take a hundred years to decompose a fallen oak. It is going on all about us in marshes and other places where vegetation is rife or accumulates. It is not perceptibly felt for the reason that it is constantly being dissipated in that great reservoir of fertility and reconstruction—the air. It is only in confined situations that the emanations become inimical to health and even deadly to the system.

EARTH SATURATION AND STABLE DRAINAGE.

Let us look for a moment on one phase of earth saturation and its effects from want of stable and house drainage.

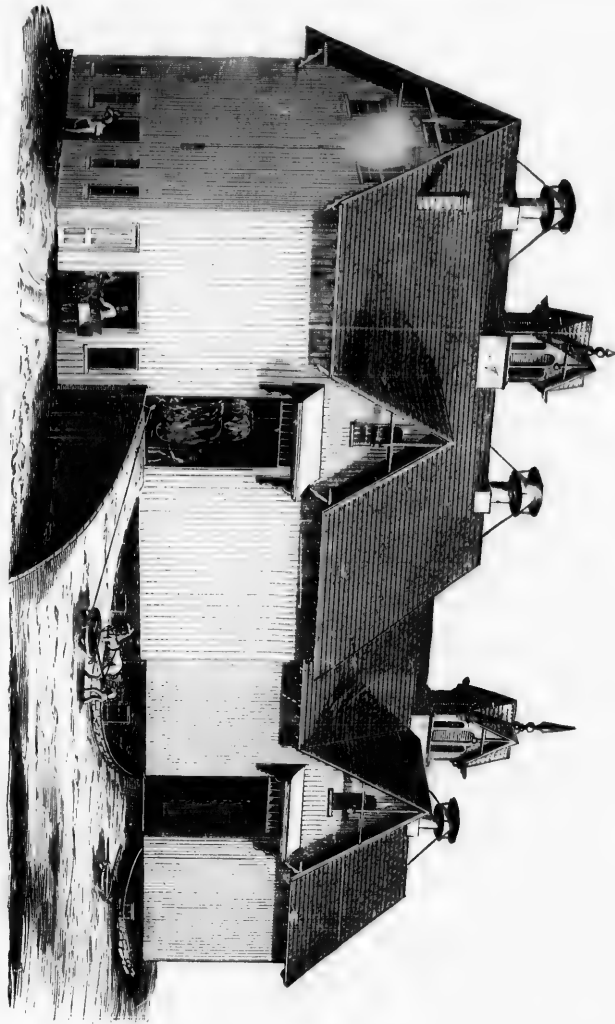
At first there is little difficulty. Earth is an ab-

sorber and fast holder, to a certain degree, of liquid and gaseous emanations when dry. When saturated with moisture to the drainage point they are passed along with the water of drainage until an outlet is reached—a well, spring or stream which is contaminated to a degree in accordance with the quantity discharged. Here is the secret of the contamination of city wells by house and stable drainage, from the want of sewage or imperfect sewage. Where there is no drainage to stables, therefore, dry earth forms not only a cheap but valuable absorbent; and a peculiarity of earth absorption is, that, saturated and again dried, its power of holding deleterious matter returns, so that the same earth may be used over and over again until its maximum capacity of holding other matters is reached. A few figures will show the relative powers of absorption of various earths, and hence will be valuable as showing also their relative power to hold organic matter.

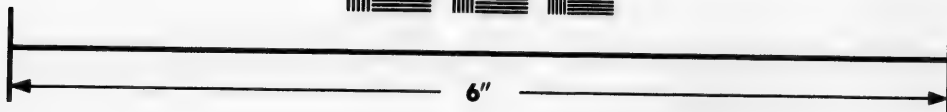
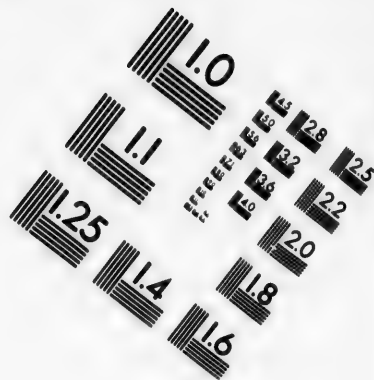
According to the experiments of Schubler, 100 pounds of dry sand will hold by attraction or take up twenty-five pounds, or one-fourth of its weight in water; a loamy soil, forty pounds; a clay loam, fifty pounds, and pure clay, seventy pounds of water. Hence, it is readily seen how small a quantity of pulverized dry clay is necessary to absorb the daily evacuations of liquid excrement in the stable. The horse, for instance, passes a large amount by invisible perspiration, voids relatively little as urine, an average of three or four pounds daily. Hence, here is shown a simple means, in the country, of getting rid of the liquid excrement, and at the same time of saving for manure the most valuable portion. In the case of sick animals this means is no less valuable, where the patient, as it should be, is kept in a box stall. The next best means is the absorption of the liquids by means of straw; oat straw being the best, for, being soft, it absorbs moisture more quickly than wheat or rye straw. Dry saw-dust, when it may be obtained, is also of much value.

One thing should be constantly impressed—the value, and economy as well, of plenty of bedding for animals. The plea of scarcity of material cannot for a moment be admitted. No more bedding is daily soiled when the animal has plenty than when there is little. This is evident at a glance to the individual who gives the matter attentive thought. Besides, if bedding material is really scarce on the farm the soiled straw may be dried and re-used.

A MODEL STOCK AND GENERAL BARN.







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STABLE DRAINAGE AND WELFARE OF ANIMALS.

We come now to the subject of drainage in its relation to the welfare of animals, both in health and sickness. We have shown the disabilities arising from want of drainage and the constant saturation of wooden and earth floors with the liquid excrement of animals. In drainage the first necessity naturally is, that the stalls must be arranged with reference to whether the animal be male or female. In the case of males, the lowest part of the stall must be between the fore and hind feet. In the case of female animals it must be just at the rear. For horses, the floor of the stall may be cut midway from the point where the fore and hind feet rest, with a shallow groove, say four inches wide and descending from the sides to the center, where it ends in a grating fine enough to prevent the escape of bedding, etc. Here it falls into a trough running under each stall and connecting with each, having inclination sufficient to carry away the moisture quickly and emptying into a tank or on the manure pile outside.

Whether there are or are not means of flushing these with water, and especially in cities, where there are such means, an ∞ -shaped trap should always be placed in the discharge pipe, particularly if the discharge is into a sewer. To keep everything sweet and clean, where there are no means of regularly flushing the drains, a saturated solution of copperas water, or powdered copperas (sulphate of iron), may be given to the drain as often as necessary. Now, if the floor of the stalls be made of some material impervious to moisture, (wood thoroughly saturated with boiling gas tar is so), there should be no difficulty in keeping the stable, whatever animals confined, perfectly sweet and inodorous. To my notion the best floor is small cobble stones laid in cement and covered with asphalt composition to render the surface smooth and the gradients perfect. In this case where the discharge pipes lead to the ground, they may connect with the vitrified pipes, tightened at the joints with water-lime cement; but, however the means of drainage, care must be taken that the fall is continuous and considerable to the outlet.

DEODORIZATION IN STABLES.

Deodorization is the driving away, covering up, or removal of disagreeable or noxious odors. A disinfectant is an agent capable of neutralizing morbid effluvia, or the cause of infection.

It must be borne carefully in mind that the destruction, or covering of odors, is not necessarily disinfection. In fact, deodorizing as generally used, is often the replacing of one odor by another, as in the case of burnt sugar, vinegar, chloride of lime, carbolic acid, etc. Neither are unpleasant odors, necessarily detrimental to health. So, also, an infectious atmosphere may present to the senses little or no cause of alarm. In fact, the most deadly typhoid germs may be present in the water we drink. It is clear and bright to the eye, the sense of smell can detect no odor, to the taste it is perfect, and it will sparkle in the glass like the purest spring water, yet it is deadly to drink. Simple odors may not be noxious; animal odors are not so unless one is confined in their atmosphere; but when they are disorganized and putrefy, they are always noxious. Here again let me reiterate: In stables the danger is not from the fresh evacuation of healthy animals, but from their continued putrefaction in and the substances saturated with them.

So far as simple deodorization is concerned there is no better agent, easily attainable, than dry, pulverized clay or strong clay loam. Charred saw-dust or pulverized charcoal is also one of the best, but difficult to obtain. These are chiefly valuable from their absorptive qualities. Pulverized gypsum is another cheap and valuable absorbent, but gypsum does not act mechanically, or rather it acts both mechanically and chemically. That is to say, one hundred pounds of gypsum (unburned) will fix or form sulphate with nearly twenty pounds of ammonia and, of course, carbonate of lime is formed. Hence its value in preventing the fumes of ammonia from escaping in any matter, as horse manure, for instance, containing it. Gypsum is also decomposed by carbonate and muriate of barytes, the carbonates of strontia, potash, soda, and of ammonia, and also by oxalic and humic acid. Hence it may be applied freely where any of these substances are suspected. For drains, cess-pools, or any confined place that gives off the smell of rotten eggs (sulphurated hydrogen), copperas, in fine powder, will be indicated, both on account of its cheapness and certainty of action. Chloride of lime and carbolic acid in solution may also be indicated when their odor will not be objectionable. To detect whether the air is pure or impure, dampen a white linen cloth in a solution of nitrate of lead and hang it in the sus-

pected atmosphere. If the cloth does not become discolored the air may be considered pure. To disinfect drinking water Condie's preparation will be indicated. This is composed of crude permanganate of potash in the proportion of half an ounce to half a pint of water. A teaspoonful to a barrel of water will sweeten it, and if it is continued to be added until a faint tinge of color is exhibited all injurious organic matter will be destroyed. To disinfect a room, put a few teaspoonfuls in the apartment and renew as often as the solution loses its color.

For ordinary use the following articles stand in relation as given, chloride of lime in combination with sulphuric acid standing as one hundred.

Chloride of lime with sulphuric acid.....	100.0
Chloride of lime with sulphate of iron (copperas).....	99.0
Carbolic acid (disinfecting powder).....	85.6
Slacked lime.....	84.6
Alum.....	80.4
Sulphate of iron (copperas).....	76.7
Chloralum.....	74.0
Sulphate magnesie.....	57.1
Permanganate of potash with sulphuric acid.....	51.3

SECTION IV.—COMBINED EARN AND STABLE.

Extensive breeders and feeders will have buildings especially adapted to the exclusive comfort of the several classes of farm stock. The general farmer requires much to be contained in one building. To illustrate this we have shown a view of one of the most complete barns in the United States. It was originally figured in one of the volumes of the Department of Agriculture, and with the description which we reproduce will readily be understood, not only by the architect, but by any intelligent builder. In this structure there are three distinct floors, and the barn consists of a main building and two wings, with dimensions as follows: Main building fifty-five by eighty feet; the east wing is fifty-six feet long and thirty-one and a half feet wide; the south wing is fifty-six feet long and thirty-five in width; total length from north to south, 186 feet. In the view from the northeast is shown the east wing and the cellar or basement wall, with the doors and windows communicating with the hog-pen, etc. The doors are all suspended upon rollers upon which they slide. The windows are suspended by hinges from the top, and swing inside. Two other views of this barn and a diagram of the live stock floors will be shown further on.

Circular tanks of boiler iron are filled with constantly flowing water in each yard. The fence and gates shutting off the cellar from the yard are movable, the posts at either end being stepped into sockets, like mortices, left in the wide bases of the brick piers. Two men in a few minutes will remove them all and throw cellar and yard together, thus giving the cattle shelter in either winter or summer. Any portion of the cellar may in the same way be forced off or opened to the yard. (See Illustrations in Live Stock Department).

On the storage floor all the hay, grain, straw and stalks are stored. Two threshing floors, sixteen feet wide, cross the building, being entered from the west. On one of these is a hay scale, and there is abundant room upon the other for a horse power and hay cutter, by which most of the coarse fodder is chopped up before being delivered at the feed trough on the floor below. Each grain and meal bin communicates by a chute with the feeding floor, where its contents may be drawn off. The greater part of this floor is occupied by the immense hay-mows through which pass the four great ventilators coming from the feeding floor. Doors open with the ventilating trunks at different heights, so when desirable, hay, straw, oats in the sheaf etc., may be thrown down to the stock. From this floor there are stairs which ascend to the cupola or observatory.

SECTION V.—ARRANGEMENT OF STABLES.

The arrangement of stables is important. The horse stalls should be many, and have every appliance for convenience possible. The partitions should be of the most substantial character, and the pavements solid and of such material that they will not absorb urine. Wooden blocks, saturated with boiling gas tar, laid with gravel pounded between and cemented with the hot tar, are among the best, as being at the same time impervious and a non-conductor. The harness room should be as near the stables as possible and at the same time in a separate room. There should be enough box stalls, twelve feet square, to accommodate the sick horses and the mares at foaling time. We advocate that horses be made as companionable as possible. That is, they should have a full view of each other and a chance to get their noses together, except in the case of vicious ones or those inclined to be quarrelsome. These must be kept in stalls of the most solid description,

with high walls and bars behind to prevent them from doing damage if they get loose. The reason why horses should be able to see about them is, there is nothing that will tend sooner to make an intelligent animal vicious and dangerous than solitary confinement. It will render men desperate. Even the dog kept chained is well known for his unreasoning ferocity.

SECTION VI.—STABLE FURNITURE.

The furniture of the stable should be complete. Forks for cleaning, splint brooms, a scoop, blankets for every horse, and extras for those coming in sweating and for sick animals are absolutely necessary. One or two full sets of clothing for the same purpose will come in handy. Bandages of various kinds, for contingencies, and a set of flannel bandages for the legs are also important. Curry-combs, brushes, whisks, rubbing cloths, a mane and tail comb and brush will also be found economical. There is no economy in allowing horses to go ungroomed, and if grooming is to be done the proper implements for performing the work are economical. It should be unnecessary to say those made of superior material are cheapest. A strong whip of the very best material should always be kept where the hand may be laid on it. If a horse gets loose and attacks another, or if an animal is refractory and will not obey, it may be found necessary to use it. These are the only causes for using a whip in the stable. An animal that never is punished unless he deserves it never fears the sight of a whip.

SECTION VII.—THE STABLE SHED.

Every stable should be provided with a close yard and shed. Here all horses should be cleaned, groomed and examined, except in inclement weather. Grooming should never be performed in the stable where horses are kept, if it can be avoided. The best stables have a room with plenty of ventilation for this purpose. It is disagreeable, not to say unhealthy, that so highly organized an animal should inhale the dust and debris of his own body. Hence a clean man will always have a clean horse.

CHAPTER X.

ANATOMY AND PHYSIOLOGY OF THE HORSE.

SECTION I.—VALUE OF A CORRECT KNOWLEDGE OF ANIMALS.

Every person who aspires to be a judge of animals, and especially all who breed horses, should un-

derstand the proper position of the bones, the muscular development, and the proper proportional parts of an animal. It is not necessary that he understands anatomy and physiology from a purely scientific standpoint, but he should be able to locate and name the principal bones, all the viscera, should understand the names of the points of an animal, else he cannot properly estimate its actual value. This will apply in a general sense, and will not need repeating. The bones of the horse should be fine, that is, hard and dense. The ribs well sprung to give roundness to the barrel, and the joints rather large as indicating strength. Further on the points of the horse will be figured.

SECTION II.—MUSCULAR DEVELOPMENT.

The physiology of muscle will be all that we can enter into here. J. H. Walsh, in his well known work on the horse, upon the physiology of muscle says:

"With trifling exceptions the whole of the movements of the body and limbs are performed by the agency of that peculiar substance, known in our butchers' shops as 'flesh,' and recognized by anatomists as muscular tissue. This constitutes the chief bulk of the soft parts external to the three great cavities (the cranial, thoracic, and abdominal), the half-starved subject of the knacker or trained racehorse, in which the fat has almost entirely disappeared, the ordinary observer will detect nothing but muscles (with their tendons) and bones beneath the skin covering the limbs. On the trunk they are spread out into layers varying in thickness, sometimes interrupted by flat tendons, so as to form, at the same time, a protection to the organs within, easily capable of extension or contraction, and a means of moving the several parts upon each other.

"Tendons resemble ligaments in being composed of white fibrous tissue. They serve to connect muscle with bone, and are useful as affording an agent for this purpose of much less compass than muscle itself, and also of a structure not so easily injured by external violence. Thus they are generally met with around the joints, the muscular substance chiefly occupying the space between them. There are three varieties of tendon: 1. *Funicular*, consisting of cord-like bands; 2. *Fascicular*, including bands of a flatter and more expanded nature; and 3. *Aponeurotic*, which are membranous, and are chiefly met with

around the abdomen. The fibers are firmly attached to the bones, which generally present rough surfaces for this purpose, and are also closely incorporated with the periosteum. This union is so strong that it very rarely gives way; and when extreme violence is used, either the bone itself breaks, or the tendon snaps in its middle. Tendons are non-elastic.

"To the naked eye an ordinary muscle appears to be composed of a number of small bundles of fibers, arranged in parallel lines, and connected by a fine membrane. These bundles may still further be separated into what seem at first to be elementary fibers; but when placed in the microscope, they are found to be themselves made up of finer fibers united into fasciculi by delicate filaments. These ultimate fibrille are polyhedral in section, according to the observations of Mr. Bowman, so as to pack closely together, and are variable in size in different classes and genera of animals. They also differ in appearance, one class presenting stripes while the other is without them. The former includes all the muscles whose movements are under the control of the will as well as those of the heart, and some of the fibers of the œsophagus, while the latter is composed of the muscles investing the stomach, intestines, bladder, etc., which are comprehended under the general term involuntary.

"The sarcolemma is the name given by Mr. Bowman to the areolar tissue investing each fiber, sometimes also called *myolemma*. It is very delicate and transparent, but tough and elastic; in general it has no appearance of any specific structure, but sometimes it presents an aspect as if there was an interweaving of filaments.

"When a fibrilla of striated muscle is examined under the microscope of a high magnifying power, it is seen to present a beaded appearance, as if made up of a linear aggregation of distinct cells, alternately light and dark. When the fibrilla is relaxed, each cell is longer than it is broad; but during the action of the muscle, it assumes the opposite dimensions, the increase in one diameter being always in proportion to the diminution of the other. As the contraction takes place, the substance becomes firmer than before, but the bulk remains the same, the mass merely gaining in thickness what it has lost in length. The application of certain stimulating agents will produce the contraction for a certain period after life is destroyed, varying according to

the vitality of the animal experimented upon and the nature of the individual muscle. This is called irritability in the striated muscles, which exhibit powerful contractions, alternating with relaxations—while in the involuntary muscles a more steady, permanent, and moderate contraction is met with, to which the name of tonicity has been given.

"Pure muscular fiber appears to be identical in composition with the fibrine of the blood, being made up of about seventy-seven parts water, fifteen and a half parts fibrine, and seven and a half parts of fixed salts. The whole of the flesh of the body is largely supplied with blood, and it is found by experiment, on the one hand, that if this is cut off contraction ceases very speedily after; and on the other, that in proportion to the amount of muscular action will be the demand for fresh supplies of blood. None of the striated muscles, except the heart and the muscles of respiration, can go on acting without intervals of rest, during which repairs in their structure are effected. If, therefore, the voluntary muscles are to be brought into the highest state of vigor and development of size, they must be regularly exercised and rested at proper intervals. During the former condition blood is attracted to them, and at the same time that fluid itself is rendered more fit for the purposes of nutrition; while during the latter period the increased flow of blood continuing allows for a complete reparation of the tissues. Thus we find the muscles of the well-trained racehorse full and firm to the touch; but if sufficient intervals of rest are not allowed between his gallops, they will present a very different feel, being flabby and wasted, and indicating that he has been 'over-marked.'

The voluntary muscles assume various shapes, according to their positions and offices. Sometimes they are merely long strips of muscular tissue, with a very short tendon at each end, as in the levator humeri and are then called fusiform. At others their fibers radiate, as in the latissimus dorsi, which is hence called a radiating muscle. A third set are called penniform, from their fibers being attached to one side of a tendon, or bipenniform, when they are fixed to both sides like the full tail or wing feather of a bird. A muscle with two masses of its tissue connected in the middle by a tendon is called digastric.

The special nomenclature of muscle is founded upon: 1st, their position, as tibialis, pterygoideus, zygomaticus; 2d, upon their action, as flexor, exten-

cor, levator; 3d, upon their direction, as obliquus cetrus, transversalis; 4th, upon their attachments, as scapulo ulnaris; and 5th, upon their division into separate portions or heads, as biceps, triceps, digastricus, etc.

In describing each muscle it is usual to speak of it as having an origin from one bone, or set of bones, and an insertion into another, the former term being generally assigned to the more fixed division of the two. This is, however, merely for the sake of convenience, and is entirely arbitrary.

Bursæ mucosæ, which are shut sacs, varying in size from that of a pea to a moderate pear, and lined with synovial secreting membrane, are placed on all the prominent points of bone over which tendons glide. Thus there is a large one on the point of the hock, and another on the elbow, both of which sometimes inflame and become filled with synovia, (fluid secreted for the purpose of lubricating the joints) constituting the states known as capped hock and elbow. A third situation is just above the sesamoid bones, where the swelling from inflammation receives the name of windgall. Where, as in the legs, the tendons have to glide to a great extent, they are invested with synovial sheaths, which are bound down by white fibrous tissue at the points where the strain is the greatest. In the limbs the muscles are bound up into masses by strong but thin layers of intercrossed white fibrous tissue, which receives the name of fascia. In the horse this is very firmly attached to the surface of the muscles beneath, and greatly interferes with the clean dissection of them.

SECTION III.—CUTANEOUS MUSCLES.

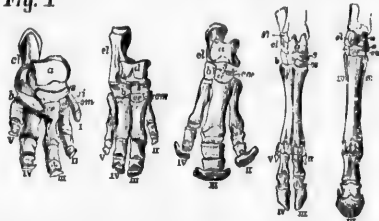
Immediately beneath the skin there is a thin layer of muscle, spread over nearly the whole surface of the body, and called panniculus carnosus. It is attached internally to some of the most prominent points of the skeleton, chiefly through the intervention of the fascia, which binds down the various groups of muscles. Externally it is inserted at short intervals into the inner surface of the skin, and into the cellular membrane beneath it. Its action is to throw the skin into folds or wrinkles, in so sudden a manner as to dislodge flies or other irritating insects. It is also powerful enough to shake off particles of dust or dirt which have fallen upon the part, and are not glued to it by any adhesive matter.

SECTION IV.—THE LIMBS AND FEET OF THE HORSE.

The limbs and feet of the horse are of such special

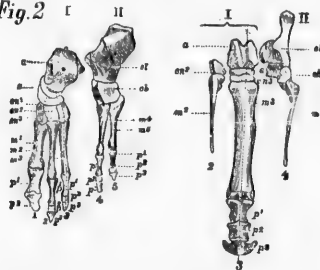
importance that we have illustrated the subject fully. And in addition to that given in a general way in a

Fig. 1



preceding section, here and in succeeding sections, covers the matter fully. Let us commence with the

Fig. 2



feet. Fig. 1 shows five classes of animals, that to the left being a complex five-toed animal; the next a four-toed; the next a three-toed; then a two-toed

Fig 3



or hoofed, and a single toe or hoof as found in the horse at the right hand. Taking five toes as the highest normal number presented in any species of animal, successive steps by which the toes have been dropped is seen. In the hippopotamus we have an example of a four-toed animal, of three in the rhinoceros, of two in the ox and of one in the horse.

In figure 2 are shown the gradations by which the three toes have been successively changed into the single toe. Fossil horses have been exhumed that

have once existed with real and rudimentary toes, and, in fact, the rudimentary toes may still exist, as shown in the right-hand example of figure 2. Fossil bones of the horse show

plainly that besides the single toe as at present, that horses have lived in past geological ages having two others perfect in form, but smaller in size, as shown at the right of figure two. The ox now has two toes and two others, the dew-claws, smaller in size than the true hoofs.

Figure 3 shows a front view of the horse's foot, corresponding to the hand of man to the wrist, the

knee; b, splint or splint bone; c, cannon bone; d, sesamoid bone; e, pastern bone; f, coronet bone; g, coffin bone. At Fig. 5 is shown bones of hind leg, front view; a, b, c, d, e, bones of the tarsus, f, cannon bone; g, pastern bone; h, coronet bone; i, coffin bone. Fig. 6 shows a side view of hind leg; a, bones of the tarsus; b, splint bone; c, cannon bone; d, sesamoid bone; e, pastern bone; f, coronet bone; g, coffin bone.

The splint bones have been shown at Figure 7. Figure 8 shows the pastern bone; Figure 9 the lower pastern or coronet bone. Figure 10 shows the coffin bone. We have given these bones dissected away from their integuments to show their exact shape, and from which may be seen by comparison with the foot and portions of the legs not only their relative

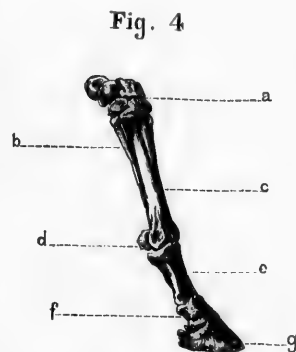


Fig. 4

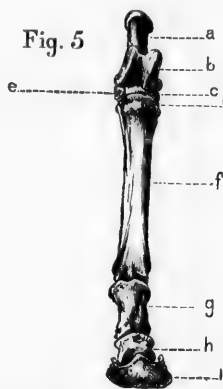


Fig. 5

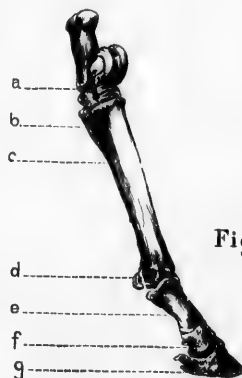


Fig. 6

toe corresponding to the nail, the fetlock to the fingers of the hand, the shank to the body of the hand, and the knee to the wrist. (Figure 7 shows the



Fig. 8



Fig. 9



Fig. 10

splint bones). Figure 4 gives a side view of the same. In this side view, d is bones of carpus or

positions but also the continuity and perfect adaptation of one part to the other. At Figure 11 is shown a typically correct view of a perfect hoof with the shoe attached, and at Figure 12 a vertical section of the interior of a hoof showing the horny laminae.

To follow the anatomy of the foot still further we extract from the report of the Department of Agriculture, the reproduction of the cuts having been kindly allowed. Relating to the bones of the foot

(see the figures as given in Fig. 14), the writer says:

Immediately below the carpus and tarsus is a single large metacarpal or metatarsal bone, called the cannon bone. Upon either side of this is a rudi-

Fig. 11



mentary bone, the splint bone. These two splint bones, expanded at their upper extremities, where they enter into the formation of the knee and hock joints, grow gradually smaller as they pass down by the side, and rather to the rear of the main bone,



Fig. 12

and terminate before reaching the fetlock joint. Below the cannon bone, taking an oblique direction anteriorly from it, is the pastern bone, long pastern, (*os suffraginis*). In length it is from one-third to one-half that of the cannon bone. Below this is the coronet bone, short pastern, lower pastern, (*os corone*) which is nearly square in form; its transverse diameter being, however, greater than its vertical.

The last bone terminating the extremity is the coffin bone (*os pedis*). This bone has been described as having a body and wings. Its general outline is



Fig. 16

semilunar anteriorly, superiorly in its convex, and posteriorly and inferiorly it is concave. In texture it is light and spongy, perforated throughout by canals, (Figs. 16 and 17), through which blood-vessels and nerves are abundantly distributed to the soft and

sensitive tissues that cover it. The wings extend directly backward from the body, and support the lateral cartilages. Upon its superior aspect is a smooth and concave surface, placed obliquely to the body of the bone for articulation with the middle phalanx or coronet bone.

Applied to the joint between the coronet and coffin bones, posteriorly, and lying in the concavity of the coffin bone, is a small bone of peculiar shape—the navicular. (See numeral 3, Fig. 14). This is a sesamoid bone, being contained in, or attached to, the tendon of the deep flexor. It is from two to two and one-half inches long,

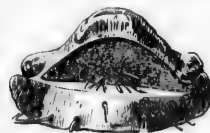


Fig. 17.

three-fourths of an inch in width at its widest part, and half an inch in thickness. Two surfaces of this bone, meeting in front at an acute angle, are covered with cartilage and synovial membrane. The posterior surface is rough for the attachment of the tendon of the deep flexor. Attached to the upper edge of the wings of the coffin bone are two lateral cartilages. They are irregular in form, elastic, and extend backward, giving form, substance and elasticity to the heel upward as high as the pastern joint, and forward, so that only the width of the great extensor tendon of the foot separates them. In fact, the fibrous investment of the tendon is attached to these cartilages.

The Cyclopaedia of Anatomy and Physiology says: The cartilage surrounds upon every side the rough and knotty extremities of the heels of the coffin bone, entering and filling up its sinuosities and taking strong attachment to these processes. It then extends horizontally inward, passing over the horny sole and bars, and, meeting the sides of the sensitive frog, intimately unites with it, forming one inseparable mass and filling together the whole internal area described by the sides of the coffin bone. The upright or lateral portion of the cartilage forms with the horizontal portion passing inward a right angle, thus making together a hollow space or receptacle at the back of the coffin bone that contains the spongy, elastic stuffing of the heels, together with the tendons, vessels and nerves passing through the sole of the foot. The upper surface of the horizontal process of cartilage is full of scabrous elevations and

depressions that defy dissection, among which is found a quantity of gelatino-ligamentous tissue.

Beneath, or to the under surface of this horizontal layer, the sensitive sole and bar are adherent. As it approaches the frog or center of the foot, it loses its cartilaginous nature and becomes coriaceous, or rather ligamento-coriaceous, in texture, agreeing in this with the internal frog. The horizontal portion or process of the cartilage known by veterinary writers as the stratiform process, is of greater thickness and substance than the other parts. It is also of coarser grain and more elastic nature. Both portions together communicate the general boundary of form to the lateral, posterior and inferior parts of the foot. When the bars and the frog are thrust upward by pressure from without, they are acting against this same horizontal flooring formed by the cartilage and the frog, and are met by the depression of the bones of the foot forced down by pressure of the weight of the animal. The whole can then dilate exteriorly along with the posterior and more elastic parts of the hoof.

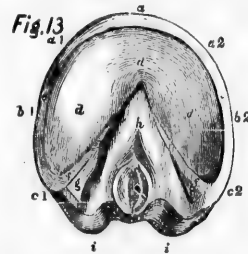
Several important purposes are answered by this extensive distribution of elastic fibro-cartilage—1, the interposition of a layer of elastic tissue between the hard hoof and the hard bone prevents shock and jar to the body as the foot strikes the ground in walking or running; 2, the coffin bone not extending posteriorly much beyond the middle of the foot, except by its projecting wings, a large portion of the hinder part of the foot is made up of soft elastic cartilage instead of bone, breaking the force of the blow of the tread; 3, the distribution of elastic cartilage serves to equalize the pressure of the bones of the foot upon the broader surface of the hoof; and lastly, this arrangement of an elastic cushion, increasing in thickness toward the posterior aspect of the foot, affords an elastic support to the movements of the coffin bone in the hoof, thereby aiding the elastic laminae upon the superior convex surface in support of the bone. While the toe of the coffin bone is comparatively stationary, there is considerable motion of the heel upon the toe as a center, thereby contributing to the extent, freedom and ease of movement of the foot.

Moulded upon the surface of the coffin bone, over its entire extent, is a thick, villous, highly vascular, and sensitive membrane having the general name of the sensitive foot, besides having several local names

derived from the part of the hoof under which it lies, as sensitive laminae, sensitive sole, and sensitive frog. This tissue is derived mainly from the skin. It may be said to be a process from the skin, covering the coffin bone, and altered in its structure to adapt it to its office as an excretory membrane. It exactly corresponds to that portion of the human skin which produces the nails. The proper skin of the leg, as it arrives at the foot, becomes thickened and altered in its structure, constituting the mass around the summit of the hoof, to which veterinary writers have given the name of coronary band. This is lodged in a groove seen around the upper edge of the horny wall, and from this the straight fibers of the wall are secreted. From the coronary band there is a prolongation of the skin downward over the coffin bone. This tissue is thrown into permanent folds or laminae, the sensitive laminae, between five and six hundred in number, arranged lengthwise of the foot. They secrete matter which enters into the formation of the horny wall, to the laminae of which they are very closely united.

THE HOOF.

Coming now to the hoof we find that the sensitive tissues that invest the bones of the foot are covered and protected by a thick, dense, horny cap or box,



the hoof. The physiological relation of the hoof to the parts which it covers is essentially the same as that of the human nail to the parts covered by it. Functionally, its relations are more extensive and complete, and whatever differences exist in structure, in form, or extent of development, come from modifications for special use. The hoof consists of three portions, which are so closely united as to seem but one; yet, by maceration, or by boiling, they can be separated. These are the wall or crust, the sole and the frog. The wall (Fig. 13, *a, c, e*) is

all that part of the hoof that is visible below the hair when the foot is placed upon the ground. It is in the form of a cylinder, cut across obliquely at the top. It is deepest in front, from three to four inches, and grows gradually less in depth toward its posterior aspect. This wall, which is secreted mainly by the coronary band, and partly by the sensitive wall beneath, is in front about half an inch in thickness, becoming thinner on the back side as it extends around the foot. It has an edge bearing upon the ground of about half an inch around the outside of the bottom of the foot (*c, c*). Upon the inner side of the foot the wall is thinner than upon the outside.

Relating to the ground surface of the hoof, *a* is the toe; *a 1*, inner toe; *a 2*, outer toe; *b 1*, inner quarter; *b 2*, outer quarter; *c 1*, inner heel; *c 2*, outer heel; *d*, *d*, sole; *e, e*, wall of the frog; *f, f*, the bars; *g, g*, the commissures; *h, k, l*, the frog; *h*, part under the navicular joint; *k*, boundary of the cleft; *i, i*, the bulbs of the heels.

THE WALL.

The wall is divided into toe, quarters, heels, and bars, superior or coronary border, inferior or solar border, and laminae. Passing any special description of the borders, the laminae deserve more particular attention. The lamina or *lamella*, are the very numerous, narrow, and thin plates which cover the entire interior aspect of the horny wall. They are in length from two inches in front to less than an inch at the heels. They are also visible over the bars. They have a very constant width of about one-tenth of an inch, and extend from the lower to the upper border of the hoof, are essentially parallel to each other, and have a free edge and two free surfaces. Each lamella is received into and is very closely united to two of the lamellae of the sensitive wall. By this arrangement the surface by which the horny wall is attached to the sensitive hoof is very largely increased, and this attachment, while possessing great strength, has great elasticity, and admits of considerable motion between the horny sole and the coffin bone contained in it. The toe (*a*) constitutes about two-thirds of the wall, and is sometimes subdivided, for minute description, into toe, inner toe, and outer toe, *a, a 1, a 2*. It is the deepest and thickest part of the wall, and stands at an angle, in the average of good feet, of about forty-five degrees. When the angle of inclination is much greater than

this, the feet are designated as flat and weak. Flat and weak feet usually obtain in large and heavy animals, and it has been thought that as the foot is flattened, the anterior wall will be drawn down, by the weight, at length becoming fixed.

THE QUARTERS.

The quarters, *b 1, b 2*, are the portions on each side, midway between the toe and the heels, and are designated as the inside and outside quarters. The fibers composing them run obliquely upward and backward, parallel to those of the toe. The quarters slope downward and backward, and become thinner as they approach the heels. The heels, *i, i*, are the two protuberant portions of the wall by which it is terminated posteriorly. The wall here is shortest and thinnest, the fibers being only about an inch in length, and not exceeding the fourth of an inch in thickness. While in its natural state there is some degree of elasticity in the entire wall, there is much more in the portion that covers the heels.

THE BARS.

The bars, *f, f*, are reflections of the wall in toward the center of the foot, on its ground surface. They gradually approach each other, and come together a little in front of the center of the foot. The bars are usually regarded as parts of the sole, but maceration shows them to be separable from the sole, but inseparable from the wall. In the natural, healthy foot, that has never been shod, the bars appear as sharpened prominences, like braces, between the center of the foot and the heels. The best writers agree that they are well adapted to keep the heels open, and prevent contraction of the hoof. In the unshod foot the bars have a bearing upon the ground, second only to that of the edge of the wall. The sole, *d, d, d*, fills the space between the wall and the bars. It is in the form of an irregular arched plate, the concavity being toward the ground. It is firmly attached, by its outer convex edge, to the inner surface of the solar border of the wall, while its inner straight edges are attached to the bars. It has been described as joining the frog, but throughout its whole extent the bars intervene between the sole and the frog. The center of the sole is the thinnest portion of it, and it also constitutes the summit of the arch. The lower circumference of the arch, which is also the thickest and strongest, everywhere abuts against the sides of the wall. The result of this mechanism is, that at every step, as the weight is

thrown upon the foot, the coffin bone descends, elongating the elastic fibrous tissue connected with the sensitive laminae, and pressing upon the highly elastic tissue of the sensitive sole, which resting upon the arch of the horny sole, causes the latter to yield and descend. The wall being elastic, especially toward the heels, is readily pressed outward, so that the ground surface of the foot is larger while bearing the weight than it is when the pressure is removed. Whenever the weight is taken off, the wall springs back, and the sole recovers its arched form. By this means the step is rendered elastic, jarring is obviated, and injury to the sensitive sole and sensitive frog is prevented.

THE FROG.

The frog (*h, k, l*) is a wedge-like mass filling the angular space between the bars, and consists not of solid horn, as might at first seem, but of a series of elastic arches. It has been not inaptly compared to an elastic keystone received into an elastic arch, communicating, in some cases, and admitting in all, the springing movements of which such an arch is capable. The base of the frog lies between and connects the posterior curved portions of the hoof, limiting to some extent their action. The sides are connected with the bars by their upper edges, leaving upon the ground surface two deep channels between the lower border of the bars and frog, which have been termed the commissures of the frog. The horny material arching over these channels is called the arch of the commissures. In the center of the frog, as we look upon its ground surface, is a deep, narrow depression, the cleft of the frog which extends further into the soft tissues of the foot than the commissures. This cleft is arched over in a similar manner, and the cone-like mass, as viewed on its inner upper surface, has received the name of frog stay or bolt. Looking upon both the exterior and interior surface of the frog, we see that with the bars it forms three elastic foldings, which act as springs to keep the heels apart and the foot well spread. In the natural, unshod hoof, the frog, though protected to some degree by the solar border of the wall and by the sharp prominences of the bars, must still receive pressure at each step.

HOW THE FOOT PRESSES THE GROUND.

The order of force in which the different parts of the foot press the ground in walking, running, etc., has been stated to be as follows: First, the solar

border of the wall; second, the bars; and third, the frog. In the foot that has never been shod the frog has nearly if not quite as much pressure in the full step as the wall. In rapid stepping the edge of the wall, which is nearest the point of the coffin bone, receives the first force of the blow, while the frog, which mainly rests upon the elastic heels, a much more yielding substance, receives the weight as the foot settles back to its level. The effect of pressure is to flatten the arches of the commissures and cleft, to widen the frog, throw out the heels, and keep the foot freely expanded. The elasticity of the step of the horse is the result of a highly compound arrangement—first, the elasticity of the sensitive laminae; second, the greater elasticity of the sensitive sole; third, the elasticity of the horny wall; fourth, the arch of the sole; and, fifth, the triple spring formed by the foldings of the frog and the manner of its union with the bars.

SECTION IV.—THE MOVEMENT OF THE FOOT.

The movements of the foot are produced by two sets of muscles, flexors and extensors, similar to the distribution of a single finger in man. The flexors are two in number, and are situated upon the posterior aspect of the leg.

TENDONS.

In the fore legs these muscles are the flexor sublimis perforatus (Fig. 14, 6) and the flexor profundus perforans (Fig. 14, 7), also called in works on farriery flexor pedis perforatus and flexor pedis perforans; also familiarly designated as the common and deep flexor muscles. These muscles take their origin in common from the internal protuberance of the humerus, and are united for a considerable distance down the arm, when they separate to form two distinct tendons. Of these, that belonging to the perforatus runs beneath the annular ligament of the carpus, to be inserted into the upper and back part of the lower pastern or coronet bone. Just before reaching the pastern joint this tendon divides, to allow the tendon of the perforans to pass through it. Each division where it plays over the joint has in it a sesamoid bone. The tendon of the perforans, lying deeper above, passes between the divided tendon of the first-named muscle, to be inserted into the posterior concavity of the coffin bone. Attached to this tendon, as it passes over the joint formed by the coronet and coffin bones, is the navicular bone, considered as a sesamoid bone in this tendon. Two

supplementary flexors, the *accessores*, are described as arising from the posterior and inferior aspect of the ulna and the radius, and uniting below with the two main flexors. These muscles flex the foot upon the leg. As antagonists to these, there are three extensor muscles situated upon the front of the leg, corresponding to the *extensor communis digitorum* and *extensor minimi digiti* of the human arm. The *extensor communis*, otherwise called in hippotomy *extensor pedis*, arises from the external condyle of the humerus, and from contiguous fascia, and from the upper and lateral part of the radius, and has a strong, fleshy belly, which terminates in a single tendon which passes down over the front of the leg to be inserted into the coronal process of the last phalanx—the coffin bone. It unites by a slip with the tendon of the next muscle.

The *extensor proprius minimi digiti* is represented in the horse by two muscles. One of these, called the *extensor* of the pastern, is inserted by a strong tendon into the side of the first phalanx, the pastern bone. The second muscle, placed between the two preceding muscles, furnishes a strong tendon which passes down in front of the carpus and becomes united with the *communis* at an acute angle. The united tendon (Fig. 14, b) passes behind the coronary border of the hoof to its insertion in the coffin bone. The office of these muscles is to extend the foot upon the leg. Another muscle, the *abductor longus pollicis*, called in hippotomy the *oblique extensor* of the cannon, by its insertion into the base of the cannon bone, acts as an extensor of the foot. A similar arrangement exists in the muscles of the hind leg. The tendon of the *plantaris*, of great strength, has a divided insertion corresponding to that of the *flexor sublimis perforatus* of the fore leg, while the *flexor perforans* sends its single strong tendon between the two divisions of the preceding muscle to be inserted into the terminal phalanx. These flexors of the foot are assisted by the tendon of the *flexor hallucis*, which unites with the tendon of the *perforans*.

The extensor tendon of the hind leg, of great strength, is furnished mainly by the *extensor communis* muscle.

SECTION V.—DISSECTION OF THE FOOT.

The dissection of the foot of the horse is important as showing the delicacy of the structure and the highly organized nature of the tissues. It is shown at figure 15, and the explanation is as follows:

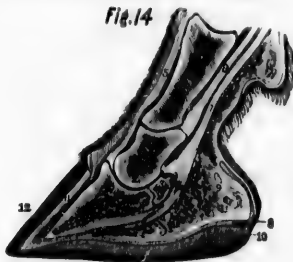
The *extensor brevis* is presented by a few fibers which come from the cannon bone, and unite with the tendon of the *communis*. The united tendon passes, as the corresponding one of the fore leg, (Fig. 14, 5) to its insertion in the coffin bone. The arteries of the foot are branches of the radial in the fore and of the tibial in the hind legs. The former descends along the radius, accompanied by the radial nerve, to a point a little above the knee, where it divides into the large and small metacarpal arteries. Of these the large metacarpal is the principal trunk, passing under the posterior annular ligament. While passing down the cannon bone it divides into three branches. The middle one is distributed to surrounding tissues, while the other two become the plantar arteries, internal and external. The plantar arteries of the fore leg result from the division of the metacarpal, and in the hind leg from a similar division of the metatarsal, and the terminal distribution is alike in both. They descend to the lower part of the cannon bone, pass the fetlock joint by the side of the sesamoid bones, in company with veins and nerves of the same names, and pass into the substance of what is sometimes called the fatty frog. They then pass the extremities of the coffin bone and enter the foramina on the posterior concavity of the bone. (Fig. 16, a, a, a, a). The branches of the plantar arteries are very numerous, and no part of the body is more fully supplied with blood than the foot. (Fig. 17). The veins of the foot constitute a very intricate network of vessels. The veins of the frog, the sole, the laminae, the superficial and deep-seated coronary veins, unite to form coronary and plantar plexuses (Fig. 8), from which are formed plantar veins, which by their union constitute metacarpal and metatarsal veins, which lie anterior to and by the side of the plantar arteries.

We here give a view of the foot and fetlock dissected, through the middle figure 14. The explanation is as follows: 1, great pastern bone; 2, small pastern bone; 3, navicular bone; 4, coffin bone (*os pedis*); 5, *extensor pedis* tendon; 6, long inferior sesamoid ligament; 7, *flexor perforans* tendon; 8, sensitive frog; 9, insensitive frog; 11, sensitive laminae; 12, insensitive laminae, wall or crust of hoof. In the next figure we shall find as follows:

1, general integument, turned back; 2, fatty mass, forming a cushion behind the great pastern joint; 3, wall of hoof turned back, showing the vertically

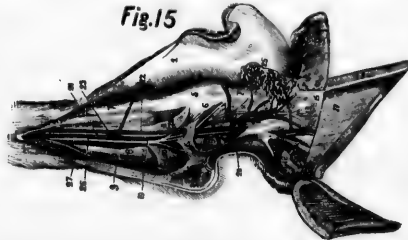
laminated processes projecting from its inner surface; 4, section of wall of hoof; 5, the articulation between the cannon and pastern bones, 6, 6, 6, aponeurotic tissues; 7, 7, extensor tendon of the foot; 8, 9, 10, flexor tendons of the foot; 11, 12, 18,

Fig. 14



14, 15, expansion of the great cartilage of the foot; 16, the coronary band raised from the hoof; 17, the vascular or sensitive hoof; 18, elastic cushion of the heels; 19, 20, 21, plantar artery; 22, 23, plantar veins; 24, part of coronary venous plexus raised from its position; 25, 26, 27, 28, plantar nerves. The nerves of the foot are known by names correspond-

Fig. 15



ing to those of the blood-vessels which they accompany. The plantar nerves lie by the side of and behind the corresponding artery, and as they descend into the foot are distributed to the same organs and regions. The final branches enter the foramina in the coffin bone, minutely subdivide in it, pass through its many canals and escape at the edges of the sole to the sensitive parts of the foot, in company with the terminal twigs of the arteries as shown in figure 17, on a previous page.

SECTION VI.—LIGAMENTS, TENDONS AND THEIR USES.

The office of the ligaments and tendons is to permit proper extension and recovery to the various

portions of the body. Fibrous tissue exists generally through the body. It is found under three forms: 1. White fibrous tissue; 2. Yellow fibrous tissue, and 3. Red fibrous tissue.

We follow Stonehenge in the description of these substances, so far as they come within the compass of this work:

"White fibrous tissue is composed of cylindrical fibers of exceeding minuteness, transparent and undulating. They are collected first into small fasciculi and then into larger bundles, which, according to their arrangement, compose thin layers or membranes, ligamentous bands or tendons. The membranous form is seen in the periosteum and perichondrium, the facie covering various organs, the membrane of the brain, etc. Ligaments are glistening and inelastic bands, composed of fasciculi of fibrous tissue generally ranged side by side, sometimes interwoven with each other. These fasciculi are held together by separate fibers or by areolar tissue. They are of all forms, from the round band to the expanded membrane known as a capsular ligament. Tendons are constructed like ligaments, but usually in larger and more rounded bundles. Sometimes they are spread out in the form of aponeuroses.

"Yellow fibrous tissue is also known as elastic tissue, from its most prominent physical characteristic, in which it differs from white fibrous tissue. It is so elastic that it may be drawn out to double its natural length, without losing its power of returning to its original dimensions. Its fibers are transparent, brittle, flat or polyhedral in shape, colorless when single, but yellowish when aggregated in masses. When this tissue is cut or torn, the fibers become curved at their extremities in a peculiar manner. It is met with in the ligamenta subflava of the vertebrae, the ligamentum colli, the chorda vocales, and membranes of the larynx and trachea, and the middle coat of the arteries.

"Red fibrous tissue, also called contractile tissue from its possessing the power of contracting under certain stimulants, is intermediate between yellow fibrous tissue and muscular fiber. Its fibers are cylindrical, transparent, of a reddish color, and collected in bundles. It has no connection with the joints, but is met with in the iris, around certain excretory ducts, and in the coats of the veins.

BLOOD VESSELS.

"White fibrous tissue contains few blood vessels. They usually follow the course of the fasciculi; in ligaments they run in a longitudinal direction, sending off communicating branches across the fasciculi, and eventually forming an open network. The periosteum is much more vascular, but the vessels do not strictly belong to the membrane, as the ramifications found in it are chiefly intended for supplying blood to the bone which it covers.

NERVES.

"Small tendons contain no nerves, and large ones only small filaments. In the periosteum, nerves are abundant; they exist there chiefly for supplying the bones with sensibility. The pain caused in rheumatism, which is an intensely painful disease, is a proof of the sensibility of white fibrous tissue."

Fibro-cartilage is introduced between the joints to give smoothness to the articulations, and the lubricating fluid for reducing the friction is called the synovial fluid (*synovia*).

MOVEMENTS OF THE JOINTS.

The motions permitted in the joints are four—namely, gliding, angular motion, circumduction, and rotation.

Gliding is the simple motion of one bone upon the other, without materially altering their relations.

Angular motion may be either limited to one plane, as in the trace-hinge, or it may be extended to more, when the motion becomes nearly allied to circumduction. The elbow and hock are examples of the former, as, indeed, are most of the horse's joints.

Circumduction is a motion very little seen in the large joints of this animal, and is confined to the hip and shoulder joints, in which it is far more limited than in the corresponding joints of the human frame. It is displayed when a limb is made to describe a segment of a large circle around the joint which connects it to the body.

Rotation is the movement of a bone on its own axis, and is only seen in the horse in the joint between the two first vertebrae of the neck.

CHAPTER XI.

INTERNAL ECONOMY OF THE HORSE.

SECTION I.—THE VITAL ORGANS.

The vital organs are those essential to life. In the full sense it implies those organs that may not be destroyed without at the same time taking the life

of the animal. The viscera as generally understood are the bowels, but really are the contents of the abdomen, thorax and cranium. In its most general sense the viscera are the organs contained in any cavity of the body. Our purpose will be served by explaining those of sensation, breathing, digestion and generation.

SECTION II.—ORGANS OF SENSATION.

The chief organ of sensation is the brain. The office of the nerves is to convey to the brain intelligence of the seat of injury and pain. It is through the nerves that we experience the pleasure of any of the senses. They are in fact the telegraphic communication between the several parts of the body and the brain, the seat of intelligence.

FUNCTIONS OF THE NERVOUS SYSTEM.

The functions of the nervous system are 1st, sensation, 2d, voluntary motion, 3d, co-ordination of motion, 4th, reflex action, 5th, the motions connected with the process of nutrition, secretion, etc.

Stimuli applied to nerves first increase and then depress their excitability. Narcotics have the power of deadening or of entirely destroying the excitability of the nerves. The action of the nerves is also affected by temperature.

INFLUENCE OF THE NERVOUS SYSTEM WITH REFERENCE TO DISEASE.

Very little is really known of the agencies at work in this system. Nervous influence is the most important, and yet the most mysterious influence in life. The nerves themselves we can trace. We know that they are given off from or, as others think, run to the brain and spinal cord from all parts of the body. We know that sensation felt at one extremity of the body is transmitted with an electrical like rapidity to the brain and thence retransmitted to the point at which the sensation is felt. The point of the nerve affected has no sensibility except as connected with the brain. Nerves are merely conductors of nervous impressions. They have no power of themselves of generating force. They require a stimulus in order to manifest their functions. Sir William Fitzwylgrams says:

"Disease of any part is, we know, connected in some way with disturbance of the nervous system of the part. Yet we cannot, we do not know how to treat the real malady; we treat the effect, as we best can. Take for instance a simple case of accelerated pulse. The acceleration is doubtless due to nervous

vesicular nerve matter traversed by tubular and gelatinous nerve fibers, enclosed in a fine membrane of areolar tissue."

SECTION III.—ARTERIAL AND VENOUS SYSTEM.

The blood is the medium by which the animal frame is nourished. It is sent out from the heart as arterial (bright, oxygenated) blood and returns through the veins as venous, or dark blood. In its rounds the veins take up the soluble portions of the digested food, and it thence becomes a part of the blood. The ramifications extend to every minute portion of the body, and the office of the blood is to supply nutriment to the various tissues, consequent on waste, to build up bone, muscle, sinew, etc., and to convey away a portion of the waste of the body, by the return of the blood through the veins to the lungs, there to be again oxygenated. To accomplish this, commencing with the capillaries on the general surface, it passes through the veins, which finally end in the vena cava, and enters the right auricle of the heart. From this it is pumped into the right-ventricle, which, contracting in its turn, forces it on into the pulmonary artery, spreading out upon the lining membrane of the lungs, to form the capillaries of that organ, from which it is returned to the left auricle through the pulmonary veins. From the left auricle it is driven on to the left ventricle; and this, by its powerful contractions, forces the blood through the aorta, and the arteries of the whole body to the capillaries.

But though the heart is thus made up of two valvular parts, they are united into one organ, and the two auricles and two ventricles each contract at the same moment, causing only a double sound to be heard, instead of a quadruple one, when the ear is applied to the chest. Though we commonly call the one venous blood and the other arterial, the distinction only applies to the general circulation; for that of the lungs is exactly the reverse, the pulmonary artery containing dark blood, and the pulmonary veins bringing it back to the heart after it is purified, and has again received oxygen sufficient to develop the scarlet color again. Between the auricles and ventricles, and again at the openings of the latter cavities into their respective arteries, valves of a form peculiar to each are placed so as to allow of the free passage onwards of the blood, but not of its return by regurgitation. If they become diseased, the action of the heart is impeded, and the circulation of

the blood is more or less seriously interfered with. So, also, if the muscular fibers, of which the walls of the auricles and, in much thicker layers, of the ventricles are composed, become weak by want of proper exercise, or from the deposit of fat in their interspaces, a corresponding degree of mischief is effected in the passage of the blood. The force with which the left ventricle contracts may be estimated from the fact that if a pipe is inserted in the carotid artery of a horse, and held perpendicularly, the blood will rise in it to a height of ten feet; and the rapidity of his circulation is such that a saline substance will pass from the veins of the upper part of the body to those of the lower in little more than twenty seconds. Now, as this transmission can only take place through the current that returns to the heart, and passes thence through the lungs and back again, afterwards being forced into the lower vessels through the aorta, it follows that every particle of this fluid passes completely through the whole circulation in the above short period of time.

SECTION IV.—THE BREATHING ORGANS.

The lungs are the organs of breathing by which the blood is kept in a state fit for the support of life. In the horse they are of special importance, and this will apply to all animals of speed, since the action of the lungs prevents clogging, enables the circulation to be thrown to the surface during violent exertion, and lessens the danger of congestion. To quote from Stonehenge: "The essence of the act of breathing consists in the absorption of oxygen from the air, and the excretion of carbonic acid from the blood which is circulated through it. In a state of rest this interchange must go on with regularity, for carbonic acid is constantly developed by the decay of the tissues, arising from the peculiar necessities of the muscular and nervous tissues, and by the conversion of the carbon of the food which appears to be required for the development of heat. But when the muscles of the whole body are called into play with unusual rapidity and force, the development of carbonic acid is largely augmented, and thus, not only is there a necessity for extra means of excreting the carbonic acid, but there is also a demand for more oxygen to unite with the carbon, which is the result of the disintegration of the muscular fibers employed. Hence the acts of respiration are more complete and rapid during exercise than in a state of rest, and while much more carbonic acid is given off,

a greater volume of oxygen is absorbed from the air which is inspired.

It has been found by experiment that if venous blood is exposed to the action of oxygen, through a thin membrane such as bladder, it absorbs a portion of that gas, and changes its color from dark red to a bright scarlet. This is in accordance with the recognized laws of endosmose and exosmose; and as the blood circulates in very fine streams within the vessels of the lungs, whose walls are much thinner than an ordinary bladder, it may readily be understood that it is placed in more favorable circumstances for this interchange of gases than when tied up in a large mass within a comparatively thick membrane. On examining the structure of the lungs, they are found to be made up of a pair of cellular sacs, communicating with the trachea, which admits air into them; and these sacs are furnished with a fine network of capillary vessels distributed on their walls, and on those of the numerous cellular partitions of which they are composed. Thus the blood, as it enters the lungs in a venous state, is submitted under very favorable circumstances to the agency of atmospheric air; it readily absorbs the oxygen while it gives off large volumes of carbonic acid gas, the result of the combination of previously absorbed oxygen with the carbon given off by the various organs of the body already alluded to.

The exact chemical changes which have taken place in the atmospheric air exhaled from the lungs and in the blood itself are believed to be as follows: 1. A certain portion of oxygen has disappeared from the air. 2. It has received a considerable volume of carbonic acid. 3. It has absorbed fresh nitrogen. 4. It has parted with some of the nitrogen of which it was previously made up.

The pulmonary apparatus of the horse consists of four parts: 1st, The nasal cavities, destined to prepare the air for entering the larynx; 2nd, Of the larynx, which acts as a portal or guard against the admission of noxious matters floating in it; 3d, Of a set of tubes, consisting of the trachea and bronchi, which convey the air from the larynx to the air-cells; and 4th, Of the air-cells themselves, where the changes are effected in the blood, for which the lungs are specially designed.

SECTION V.—THE DIGESTIVE ORGANS.

It is not necessary to go into the anatomy of the abdominal organs. The nature of the processes

carried out by them is, however, important to every one. To do this the food must be traced from the time it enters the mouth until the portion not taken up is expelled by the anus.

Commencing with the mouth, the food is there ground down by the teeth and mixed with the saliva, which acts in converting the starchy matters, which form so large a proportion of the horse's food, into sugar. and, with the aid of the gastric juice, into the proteine compounds necessary for the formation of flesh. Perfect mastication and insalivation are therefore highly important processes to healthful digestion. When it reaches the stomach the food undergoes still further changes by the agency of the gastric juice and of maceration; but this organ being small in the horse, it can not remain there long enough to be converted into perfect chyme (the result of the first process of digestion), but is passed on into the duodenum for that purpose. Here it is further elaborated and receives the bile and pancreatic juice, which are poured out through their ducts opening on the internal surface of this intestine. The nutritious parts of the food are now gradually converted into chyle, and as it passes into the jejunum and ilium it is there absorbed by the lacteals, whose mouths open upon the villi thickly lining this part of the canal. These unite into one duct (the thoracic) and the chyle is by it carried into the veins through an opening at the junction of the left vena cava anterior with the axillary vein. From the small intestines the food, minus its nutritive portions, is passed on into the large intestines, and finally reaches the rectum and anus in the form known as feces. (It is that matter known by the name of excrement). The peculiar offices performed by the bile and pancreatic fluid will be described under the sections treating of each of those organs.

The absorption of fluid from the interior of the alimentary canal is effected in two different modes—first, by the lacteals, which take up the chyle through their open mouths; second, by the veins, which absorb it through their walls by the process known as endosmose. In the former case the chyle is at once carried to the heart, but in the latter it passes through the liver and becomes purified and chemically altered in that organ. The lacteals pass through the mesenteric glands, which lie between the layers of the mesentery.

Glands are organs whose office it is to separate from the blood some peculiar substance, which is poured out through an excretory duct, whose internal surface is continuous with the mucous membrane or skin. A simple gland is a pouch of mucous membrane; a collection of these pouches constitute a compound gland, which, if the groups of which it is composed are loosely bound together like grapes, as in the salivary glands, is called conglomerate, while if they are united into a solid mass, such as the liver, the term conglobate is applied.

By secretion is understood the process of separation of various matters from the blood, the term being also applied to the products of the process, such as saliva, bile, etc., which are commonly known as secretions. These are all removed from the blood for one of two purposes; first, in order to be employed for some ulterior object in the various processes going on in the body, either for its own preservation or that of others; or, secondly, as being injurious to its welfare, and therefore to be discarded. The term secretion is sometimes confined to the former, while the latter action receives the distinguishing term excretion; but as in many cases the fluid which is removed as being injurious to the system is also used for beneficial purposes, the distinction is not capable of being strictly maintained. The nature of the process is essentially the same in all cases, being carried out by the development of simple cells, each possessing its own independent vitality. These cells select certain ingredients from the blood, and then set them free by the rupture of their walls; and being situated on the free surface of the lining membrane of the gland, which is continuous with the mucous membrane or skin, the secreted fluid gradually reaches the one or the other. The cells of the liver select the elements of bile, those of the salivary glands, saliva, etc. The elements of the various secretions exist in the blood, and therefore the office of the glands is confined to the selection and separation of their products, and they have little or nothing to do with their conversion.

OFFICE OF DEPURATION IN THE ANIMAL ECONOMY.

The whole of the various secretions which go on in the body are necessary for the due preservation of its health, but the most important of the class alluded to as excretions must be removed from the blood, or death will ensue. Thus, if saliva and gastric juice, as well as the other secretions aiding di-

gestion, are not mixed with the food, the nutrition of the body will be imperfectly carried on and its health will suffer. But if the elements of bile and urine are retained in the blood not only is the system upset, but absolute death is produced in severe cases. Hence it follows that attention to the state of the organs of depuration, or excretion, is of more importance even than to those of secretion, using these terms in the sense explained in the last paragraph. The chief organs of depuration are the lungs, which remove carbon from the blood; the liver, which secretes the bile; the kidneys, which get rid of the urea and the skin, which relieves it of its superfluous watery and some small proportion of its solid particles. Experiment shows that the retention of carbon, or urea, in the blood is speedily followed by death; while the non-secretion of bile, if entire, poisons the system, and in milder cases its absence from the alimentary canal interferes with the due elaboration of the chyle.

SECTION VI.—THE ORGANS OF GENERATION.

The male organs of generation consist of the testes and their ducts, the vasa deferentia, the latter conveying the semen to the urethra or to the vesiculæ seminales, which are oval bags connected with the upper surface of the neck of the bladder. Here the seminal fluid is stored up for use, and when wanted is conveyed into the vagina by means of the external organ or penis. The anatomy of the testicles is that which mainly concerns the horse-master, as they are generally removed by operation. They are contained within the scrotum, which is externally composed of skin, wrinkled in the foal, but subsequently distended by the size and weight of its contents. Beneath this is a layer of a pale yellowish fibrous membrane called the dartos, which envelops the testes and forms a separation between them. A thin coat of cellular membrane alone separates this from the double serous membrane, the tunica vaginalis, which almost entirely envelops each testis, just as the pleura does the lung. In the early stages of fetal life the testes are contained within the abdomen above the peritoneum, but being attached to the scrotum by a thin muscle (the cremaster), they are gradually dragged downward through the inguinal canal; and each brings a double layer of peritoneum, which continues its connection through life, so that fluid injected into the cavity of the tunica vaginalis will flow into the peri-

toneum. Hence inguinal hernia in the horse becomes scrotal in a very short space of time, and rarely remains confined to the former position. The testicles with their appendages, the vesiculae seminales, form the semen by the usual process of secretion. Besides their attachment by the reflections of the tunica vaginalis to the scrotum, they have also the spermatic cord which suspends them to the inguinal canal through which it passes. This cord is divided in castration, and it is well to ascertain its component parts. They are:

1st. The artery which supplies the testicles with blood, and is of considerable size and tortuous in its course. 2d. The artery of the cord, small and unimportant. 3d. The veins which accompany these arteries. 4th. The nerves and absorbents, the division of the former giving great pain and causing a slight shock to the system. 5th. The vas deferens or duct carrying the semen to the urethra, and possessing walls of such thickness that it feels like whip cord under the finger. These several parts are connected together by cellular membrane and covered by the two layers of reflected peritoneum, namely, the tunica vaginalis and tunica vaginalis reflexa, by the thin layer of cremaster muscle, as well as by a fourth investment, a continuation of the superficial fascia of the abdomen. All these parts must be divided before the canal is reached, for operating in castration.

The female organs of generation are essentially the ovaries, the uterus and its appendages forming the bed in which the embryo is nurtured to maturity. The ovaries are two small oval bodies, about the size of large walnuts, situated behind the kidneys, and having the fimbriated extremities of the fallopian tubes hanging loosely adjacent to them. These tubes, one on each side, terminate in the uterus, which is of a remarkable shape in the mare. It consists of a body and two horns. The body has a mouth, which opens into the end of the vagina, while, in itself, it is oblong, and in the unimpregnated state it is entirely contained within the pelvis. Anteriorly it divides into two horns (cornua), which diverge toward the loins, turning upward, and lying under the wings of the ossa ilii. They terminate in rounded extremities. Each cornu receives the fallopian tube of its own side, the opening being so small as scarcely to admit a silver probe. The vagina lies between the bladder and rectum, and is about

eighteen inches in length; it is lined with mucous membrane, and surrounded with muscular fibers, which form the sphincter vaginae.

CHAPTER XII.

EXTERNAL EXAMINATIONS OF THE HORSE.

SECTION I.—THE HEAD AND NECK.

The head of the horse is the seat of intelligence. The neck gives flexibility to the head, by the various positions it assumes, enables the head to assist in preserving the equilibrium of the horse in various stages of speed, and in preserving the distinctive elegances of carriage so much coveted by fashion. From the illustrations given the breeder will be able to inform himself as to the various features and traits of disposition in the horse, and in connection with the study of the quarters, and position of the limbs and feet, correct and otherwise, will constitute one of the most important series of object lessons presented in this work.



FIG. 1—THOROUGHBRED HEAD.

Fig. 1 shows a very good head, and that of a thoroughbred horse.



FIG. 2—Trotting Form.

Fig. 2 shows a good head of a trotting or road horse, and also a most excellent neck, sloping finely but in a muscular manner to the shoulders.

Fig. 8 shows a good head, but with the neck too thin, deficient in strength. A moderately thin neck



FIG. 3—Neck Too Thin.

assists pliability. If too thin the animal will never drive pleasantly, and even in riding will be unpleasant and often difficult to manage.

The setting on of the heads of all the preceding is correct. From these all the way through the next



FIG. 4—Stubborn. Bad Farm.

column are worse and worse, until that in Fig. 4 is about as bad as it can be. A horse with his head in this position is nearly uncontrollable when frightened. For purposes of draft the neck should be very

much thicker than for uses of pleasure, but the head should nevertheless be set on properly. To illus-



FIG. 5—Shapely and Muscular for Draft.

trate this we show two forms: Fig. 5, with shapely muscular neck, somewhat thick at the setting on of the head, but nevertheless well proportioned, since the head is broad, strong and with a rather large muzzle, not a fault even with driving horses, though with large flexible nostrils the muzzle may be exceedingly fine. Fig. 6 shows a bad neck, and also a badly

disproportioned head. Such a horse will be a hard feeder, and generally worthless altogether.

The next cuts, Figs. 7 and 8, are both



FIG. 6—Altogether Bad.

bad. Fig. 7 is ewe-necked, the head set on too high, a regular star gazer. The dished face, the

shape and position of the ears, and the wild eye denotes a vicious and dangerous horse, and at the same time one with little stamina. The Roman nose also denotes stubbornness.

Fig. 8 shows a strong, muscular, but at the same time unsafe horse. The position of the ears; the eyes high in the head and with surly expression; the pronounced Roman nose, thick neck and jowl should prompt the buyer to refuse him. Such a horse, if properly kept in hand by a competent driver, may be



FIG. 7—An Ewe Necked Drute.



FIG. 8—A Treacherous Rogne.

managed in a team. You never know, however, when he may become vicious and intractable. Such a horse should never be driven single.

The dolt or fool is shown in Fig. 9. He should be discarded as only fit for the cart, the scavenger wagon or the tread-mill.

Now in all this we simply wish to inculcate the idea that a good horse, whatever his breed, must be fitted to the work in hand. He will not be a perfect animal. None are from our artificial standpoint. The most that can be expected is a horse "with



FIG. 9.

many good, few indifferent, and no bad points." It must be remembered with the horse as with a chain, that the strength of the whole is measured by the weakest part. Hence in buying a horse examine particularly for the weak points. If these are pronounced, refuse him for any service. In the draft horse we look for well-sprung ribs, breadth of chest, and necessarily fore legs

wide apart. In the racehorse, trotter, or fast driver they are faults. Hence the advice we have given, study the horse for the purpose for which you intend him.

SECTION II.—BODY OF THE HORSE.

The essentials connected with the body, and in fact, with the whole external appearance, of the horse—and this again will apply to the several animals treated—must be studied in the several cuts given of the various breeds. The body of the horse is simply the medium to connect the limbs with each other through the spinal column and the muscular development, to hold the vital organs, and to become the medium by which all the several parts of the animal may act in harmony. A study of the illustrations of the various breeds, and of the skeleton, will show what the body ought to be in its outward conformation. If it resemble these, as the best types of their kind, the observer will not go far astray in his selections if he studies carefully the more essential points which we illustrate. We have heretofore spoken of the different conformations of the back. In the illustrations here given, are three figures of the horse as seen from a side view. The top view shows a good back and general good contour. The central figure shows a hollow backed horse, and the lower figure a roached back horse. The hollow backed horse may be a good draft horse. The roach

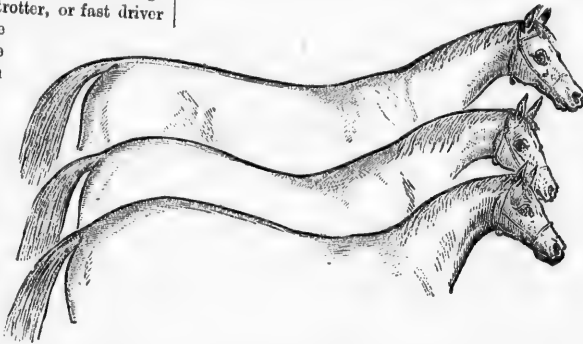
backed horse may carry weight, but the figure as shown at the top is the best because the most perfect horse. Such a horse will generally have all the parts of the body normally developed, and will be able not only to carry weight on his back, but will also be able to pull a load.

SECTION III.—THE POINTS OF THE HORSE.

The points and conformation of the horse may properly be shown together.

THE BACK.

The back should be straight and not over long. It is strongest when straight and short, and weakest when both long and hollow. A certain amount of length in the back is, however, essential to speed. Though shortness of back is an item in strength, as



regards carrying weight, yet the reader must remember that too much must not be sacrificed to any one point. The chief use and value of a horse is his power of locomotion. Again a horse with a very short back is apt to overreach, unless his shoulders are very oblique and his action good. Moreover, he cannot get his hind legs sufficiently under him.

Backs, which are in their original formation hollow, invariably give way and become more hollow under the influence of weight and age. Horses, however, with hollow backs have usually good crosts, and one weak curve is to a certain degree compensated for by the counter curve. All backs, we may mention, though originally straight, become more or less hollow with age. This effect is due partly to the ordinary mechanical effect of weight on a given line, and partly to wasting away of the muscles with age.



FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.



FIG. 6.



FIG. 7.



FIG. 5.



FIG. 8.



FIG. 9.

In young horses the muscles along the line of the back should stand as high or higher than the spinous processes of the vertebrae of the back bone.

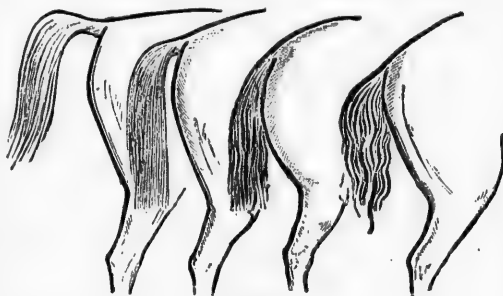
A horse with a roach back is generally rough and uneasy in his paces and apt to overreach. But the formation is favorable to strength, and if his shoulders and quarters are good and he is well-bred, the animal will generally be found to be valuable as regards power and endurance.

See illustration, The Back of the Horse. The top figure shows a good back, the central figure a hollow back and the lower figure a roach back.

THE TAIL.

The hair of the tail in the well-bred horse is distinguished by its fineness and straightness. A thick coarse or curly tail generally indicates want of breeding.

In the well-bred horse the tail is carried firm and



Good to Bad Hindquarters.

well away from the hind quarters. There is an appearance of force and muscularity about its root. It is set on almost in a line with the back-bone. When so placed it is capable of affording great leverage to the hind quarters.

A tail well set on is a great ornament to a horse. The Arab carries it almost straight out in a line from the spine. In the underbred animal the tail is usually set on low down, possesses no muscular power, clings to the hind quarters, and altogether looks mean.

Fine curly hair is occasionally, though not very often, found in the tails of even thoroughbred horses. The illustration of hind quarters and tails will explain our meaning.

THE HIND QUARTERS.

The hind quarters are important. They should be long, deep, fully rounded externally, and will be well placed under the center of gravity. The best thoroughbred horses are straight and long in that portion from the pelvis to the tail. So should be every other good horse, whatever the breed. The illustrations, good to bad rumps, will fully show our meaning. The best form is at the left, and the worst at the right.

Let us now show how a horse should stand when looked at sideways behind. Fig. 1 shows the commonly received idea of correct position.

It is not correct. Fig. 2 is the correct position.

In the next illustration Fig. 3 shows a horse standing too straight. Fig. 4 shows the limbs too much bent.

Fig. 5 shows the hind leg too far behind.

Again at Fig. 6 we show a leg with a badly developed tip of the hock. The hock is not "well let down." Fig. 7 shows a well developed os calcis. The hock is "well let down."

REAR VIEW OF LIMBS.

Coming now to the rear view of the horse, we find that Fig. 8 has the hocks too close. He points his foot out too far, is in fact splay-footed. Fig. 9 has the hocks too wide—is parrot-toed. The horse should stand with the hocks and the hoofs square. Then he will step straight. A close study of the object lessons here given ought to enable any intelligent observer to form a correct idea of what a horse should be.

THE FORE QUARTERS.

Coming now to the fore quarters the illustration will give a good idea of shape, obliquity of shoulder, setting on of the neck and carriage of the head. Fig. 10 shows good conformation and carriage, and Fig. 11 bad shape and position.

Viewed from the front Fig. 12 shows the correct position of the feet.

In figure 13 the limbs are too near together at the hoofs. The horse is bandy-legged. In figure 14 the feet are too wide apart, and the horse straddles.

Figure 15 shows the fore limbs front view, with the toes turned out, and figure 16 with the toes turned in. For the correct position look again at

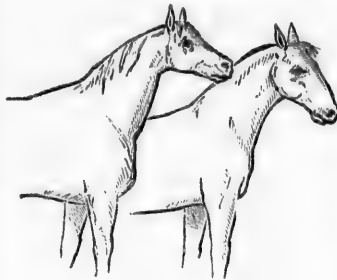


FIG. 10.

FIG. 11.



FIG. 12.



FIG. 13.



FIG. 14.



FIG. 15.



FIG. 16.



FIG. 20.



FIG. 21.



FIG. 17.



FIG. 18.



FIG. 19.



FIG. 22.



FIG. 23.



FIG. 24.



FIG. 25.



FIG. 26.



FIG. 27.

figure 12. Now if the horse stands as in figure 2 on a side view, he will be correct.

SIDE VIEW OF FRONT FEET.

In the side view of the front the fore leg shows a large knee, for the knee in common with all joints should be large and prominent. It is shown in figure 17. A calf or buck knee is objectionable. It is shown in figure 18. This formation causes undue strain on the ligaments and tendons. A small knee, as shown in figure 19 is, of course, most objectionable. If the fetlock is very long it is objectionable. Such a fetlock is shown at figure 20. Such are weak. If, on the other hand, they are very short, they lack flexibility. This incorrect form is shown at figure 21.

Coming now to correct position of limbs, we present three figures. Figure 22 shows a good limb and in correct position. Figure 23 is too straight and lacks flexibility; it is too rigid in the pastern. Figure 24 shows that the pastern is too long and weak.

We have thus far shown a line dropped down the middle of the leg. Let us examine the fore limb with a line dropped down from the bosom. Figure 25 shows the correct position; figure 26 the limb standing too far back, and, again, figure 27 shows a weak knee and fetlock, the limb straight but out of position on account of weakness. The reader who has carefully examined these illustrations should have made himself a pretty good judge of how a horse should look, either from the front, rear, or side view, both as to the body and limbs.

CHAPTER XIII.

THE TEETH—THEIR WEAR AND PECULIARITIES.

SECTION I.—WHY HORSES' TEETH DIFFER.

While the horse's teeth are a correct index to age, it must be remembered that essential modifications must take place, especially with young horses, according to the nature of the food. Young horses feeding on gritty pastures will wear their teeth much faster than those grazed on loams and clay lands, especially when the sward is firm, as is usually the case in such soils. Horses when put to work and kept constantly in the stable and fed on ground and moistened food will give comparatively little wear to the teeth in comparison with those which are pastured in summer and stabled in winter on dry hay, receiving whole or unbroken and dry grain in connection summer and winter. These are

the principal causes of a modification of the wear of the teeth. Yet he who studies the illustrations and the descriptions which follow need not err. A comparatively small practical experience will enable one to judge with a fairly close approximation to certainty, and further examination will make him expert.

OTHER GUIDES TO AGE.

The teeth are not the only guides to the age of the horse. In old age the eyes will be sunken, the edge of the lower jaw will get thin and sharp like the edge of a dull knife. The joints of the tail will become sharp and prominent, the bones will as a rule also become prominent, and the coat loses its elasticity and softness.

STRUCTURAL ALTERATIONS OF THE TEETH.

Whatever the tricks of dealers and jockeys, in the alteration of the teeth by filing, burning and other means practiced in altering the appearance of old horses to give the teeth a resemblance to that of a mature horse, there need be no difficulty in determining the age of the horse up to the sixth year, and these structural alterations are continuous and progressive up to this time. The alterations are then somewhat modified, but to the practiced eye no less distinct.

BISHOPING.

Now in the process of filing the teeth of an old horse to make them look younger, called Bishoping, from the name of the scoundrel who invented it, a careful examination will easily detect the fraud. They cannot restore the wall of pearly enamel, neither can they perfectly simulate the real mark. The illustration of the real and filed mark will illustrate our meaning, the enamel surrounding it, while the filed and burned tooth simply shows black as to the mark. See page 105, Fig. 1 and Fig. 2.

ILLUSTRATING THE WEAR OF THE TEETH.

To show the natural wear of the teeth, the figures given represent a tooth with successive thin sections sawn off, showing the yearly wear. Suppose the tooth represents an eight year old surface, the other surfaces represent the appearance of the tooth by successive years' wear. An examination of the cuts given on page 105 will fully explain this. The illustration page 108 fully explains itself. At A is shown the orifice at the top of the tooth outside of the jaw, and B shows the canal in the root of the tooth. (See section of tooth.)

SECTION II.—STRUCTURAL CHANGES OF THE TEETH.

Numerous writers have written upon this subject, from Youatt down. Voluminous works have been written thereon with elaborate engravings. All the practical man needs to know is that which will enable him to tell the age of a horse from outward appearance, without going into the anatomy and physiology of the subject. The grinding teeth are called molars, the nippers incisors, the tusks are called canine teeth, and supplementary teeth sometimes on each side of the jaw, are called wolf teeth. These may be easily removed with a pair of nippers. They do not occasion blindness as is thought by some, except by inflammation of the eye, through sympathy, from excavations and abrasions of the mouth by these teeth.

THE BACK TEETH, CALLED MOLARS OR GRINDERS.

Of the teeth in general, Sir James Fitzwygram says:

The foal is usually born with two, sometimes with three, temporary molars in each jaw. At about twelve months old another molar, a permanent tooth, appears, and before the completion of the second year a fifth molar, also a permanent tooth shows itself.

At about two and a half years old the two anterior temporary molars are replaced by permanent teeth, and between three and four the remaining, or third, temporary molar is similarly replaced; and about the same time the last or sixth permanent molar begins to appear. Thus when the mouth is completed, there are six permanent molars in each jaw, or twenty-four in all.

These structural changes afford a very good index of the age of the horse up to the period when they are completed, namely, four years old. The molars, however, are seldom referred to, because their position at the back of the mouth renders their examination inconvenient and often very difficult. Nevertheless, it is useful to be acquainted with the structural changes of these teeth in cases where there may be a doubt as to the true age, as indicated by the incisors. After four years old, the molars are not often taken into consideration in determining the age of the horse.

THE ANTERIOR TEETH OR INCISORS.

The anterior teeth, or incisors, are six in number in each jaw, when the mouth is complete; and in the immediate rear of these in males, there is usually

added one very peculiar pointed tooth on each side in each jaw, called a tusk. Though there are two crops of incisors, yet there is but one of tusks. In fact, these teeth, though they begin to appear about four years old, are not usually fully developed until the last permanent incisor is more or less up. (See cut of tusks, page 106.)

For the sake of brevity we shall confine our remarks to the lower jaw, as the structural changes which take place in the upper are nearly similar. In passing, however, we may remark, that the upper incisors are considerably longer and larger than the lower.

DISTINCTION BETWEEN TEMPORARY AND PERMANENT INCISORS.

Temporary, otherwise called milk, are easily distinguished from permanent incisors by the following well-marked signs, namely, they are smaller, whiter,



Incisors of the Foal.

and have more distinct necks. They are smooth externally, and grooved on the inside,—probably in order to enable the foal more easily to grip the teats of the dam. Their fangs are small and have but little attachment to the gums. The jaws are plump, fleshy and round, and the teeth are arranged in something like a semicircle.

Permanent teeth, on the other hand, are larger, broader, wider in their necks, grooved externally and smooth internally, and more discolored than milk teeth. The discoloration is due to the lodgment of the juices and other matters connected with the food in the grooves. The object of the external grooving probably is to enable the animal to get a better grip on grass and such-like food. The plumpness and circularity of the jaw is less than in the younger animal, and it gradually decreases, until in old age the teeth are arranged in a nearly straight line.

THE TEMPORARY OR MILK INCISORS.

The foal is born with his teeth in a rudimentary state in the gums. At various periods during the first ten months the different temporary incisors

appear. Under one year old the foal is also clearly distinguished by a woolly tail. (See incisors of the foal.)

The yearling is complete in all six incisors, but several well-marked signs distinguish his mouth from that of the two-year old. The teeth at this period



Teeth of the Yearling.

show but little signs of wear. The corner teeth are mere shells, having no inner walls, and all the teeth are in close juxtaposition.

At two years old, the inner wall of the corner teeth has grown up level with the outer wall. The center teeth show considerable signs of wear, and indeed all the teeth appear somewhat smaller than



Teeth of the Two-Year Old.

they did in the yearling. They also stand somewhat wide apart at their necks on account of the gradual growth of the jaw in width.

THE PERMANENT TEETH.

A few months before three years old, the horse sheds the two center milk teeth, which are replaced by permanent. Thus the jaw contains at three years old two center permanent teeth and two milk teeth on each side.

A few months before four, the horse sheds the two next milk teeth, which are replaced by permanent. Thus the jaw now contains four permanent and one milk tooth on each side. The appearance of the mouth, when closed, and also the mode in which the teeth meet, are shown further on and may be contrasted with a figure which shows the

mode in which the mouth closes and the teeth meet in extreme old age. (See page 106.)

A few months before five, the horse sheds the two remaining milk teeth, which are replaced by permanent. Thus the jaw is now furnished with six permanent incisors, but the corner teeth are mere shells, having no internal wall. The absence of this wall distinguishes the five from the six year old mouth. (See cut, five year old mouth and tushes).

A few months before six, the inner wall of the corner teeth has grown up level with the outer wall. (See cut, six year old mouth and tushes).

The mouth is now fully complete in incisors, and no further structural changes take place in them. As a general rule, we may add that the upper temporary teeth fall out a little before those in the lower jaw.

Up to six years old, therefore, inasmuch as we have structural changes to guide us, there can seldom be any doubt as to the age of the animal. There are, however, some well-authenticated instances of abnormal development of the permanent incisors, but they are rare.

Thorough-bred horses date their age from the 1st of January, whilst other horses are reckoned from the 1st of May. Thorough-bred mares are covered so as to throw their foals as soon as possible after the first of January; whilst in regard to other mares the owner does not wish to have their progeny born before the spring grass is available for the sustenance of the dam and her foal.

High feeding encourages the growth of the teeth in common with the rest of the frame. Hence thorough-breds (independently of their earlier date of foaling) are somewhat more forward in their mouths than half-bred animals.

DRAWING OF MILK TEETH.

A practice prevails of tampering with the milk teeth in order to make the animals appear of more mature ages than they really are.

In horses rising four years old the corner temporary incisors are pulled or punched out, in order to hasten the growth of the permanent teeth, which would in the process of nature take their place at a later period, and thereby give the horse the appearance of rising five years old.

There is, however, no need for any one to be deceived as to the real age of an animal which has been subjected to such treatment. The upcoming

permanent tooth is usually displaced in its alveolus or socket by the violence used in punching out the permanent tooth. Again, the removal of the milk tooth before its time deprives the upcoming permanent tooth of its natural guide to the surface of the jaw, and causes it to make its appearance slightly diagonally to the curve of the jaw, thus leaving a space between it and the neighboring tooth, which is quite abnormal.

Again, the enamel of the crown of the new tooth, from having been brought into use before its natural time, is not properly consolidated, and hence presents an irregular appearance, quite different from that of the naturally developed tooth.

In males this trick may be at once detected by the absence of the tusk, which will not come up before its proper time; in mares we have not this assistance.

THE MARK OF THE TEETH.

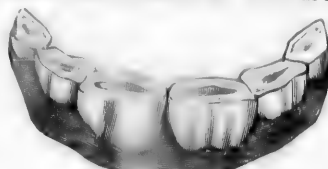
Hitherto we have taken no notice of the "mark" or infundibulum. We have abstained from doing so, not because the marks in the young mouth do not afford some indication of the age; but because fuller and more satisfactory evidence up to six years old is afforded by the structural changes detailed above. After six, however, we are compelled to have recourse to the indications given by the marks and other slight, but gradual alterations which take place in the form of the teeth.

A satisfactory explanation of the mark cannot be given without entering at some length into the structure and organization of the teeth. The mark or infundibulum is a peculiar hollow extending, when the tooth first comes up, about half an inch down the temporary and rather deeper down the permanent incisors. (See page 105, showing sections of tooth and also removals of sections by the saw.)

Teeth practically may be said to consist of two materials, namely, enamel and dentine. Enamel, which is very hard, sharp, and originally of pearly whiteness, covers the outside of the teeth, and also lines the sides and bottom of the hollow or infundibulum. Thus in the tooth, as it originally appears, there are four walls of enamel. The remainder of the tooth consists chiefly of dentine, a substance of considerable, but less hardness than enamel, and more like ivory. A small quantity of crista petrosa is also found on the outside.

When an incisor first comes up the hollow affords lodgment for the debris of the food and the juices

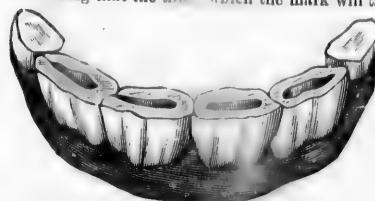
expressed from it, and therefore soon looks black. As the tooth wears down, the hollow, of course, disappears; but the surface of the dentine immediately below the original hollow, being a somewhat soft material, has become stained for some distance down. Thus there is still a black mark. With the further



At Three Years.

wear of the tooth the stained portion of the dentine wears away, and the "mark" is then said to be out. The mark, as the reader will easily see from this description, is in a constantly changing condition.

Premising that the time which the mark will take



At Four Years.

to wear out will vary to a greater or less degree, according to certain circumstances heretofore detailed, we give some general rules for guidance.



At Five Years.

Between three and five years old the marks are very plain in all the permanent incisors. (See figures of these ages.) At six the marks are wearing out of

the two center teeth, which came up at three years old. They are plain in the two next teeth and perfectly fresh in the two corner teeth. (See age at six.)



At Six Years.

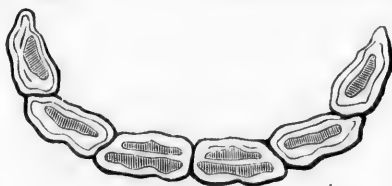
At seven the marks have disappeared from the center teeth, are wearing out of the two next, and are distinct and plain only in the corner teeth. (See seven years.)



At Seven Years.

At eight the marks have disappeared from all but the corner teeth, in which they are becoming indistinct. (See cut eight years.)

At nine the marks are not usually found in any of the teeth.



At Eight Years.

For about two years after the mark has disappeared in each tooth there may still be seen in the form of a star a trace of the enamel which lined the bottom of the original hollow, and which underlies

it for some depth. This star, of course, decreases in size with the wear of the teeth. About twelve or thirteen the last traces of the enamel have usually disappeared even from the corner teeth, but it may remain some time longer.



At Nine Years.

Many casual circumstances, however, cause a certain degree of deviation from these general rules. The time which the mark takes to wear out will vary in different horses, according to the hardness or otherwise of the teeth, and according to the nature of the food on which the animal is kept. In grass-fed horses the marks usually remain at least a year and sometimes two years longer than in those fed on hard food. Again in parrot-mouthed horses, that is, where the upper overlaps the lower jaw, the marks may remain for many years.



Parrot or Under Hung Mouth.

On the other hand, some horses, which have a trick of biting the manger, wear down their teeth very rapidly, and therefore lose their marks very early. Horses fed on salt marshes where the sea sand is washed up among the grass, or on sandy plains or meadows, are affected by the increased friction on the teeth caused by the sand. Occasionally a projecting tooth in the upper jaw may cause unusual friction on the corresponding tooth of the lower jaw, and so may hasten obliteration of the mark.

Most of these and other causes of irregularity or wear, which might be mentioned, are at once apparent to a careful and accurate observer, and will scarcely prevent his forming a pretty correct opinion of the age.

The upper incisors, as previously stated, are considerably longer and larger than the lower, and the infundibulum is nearly twice as deep. The marks therefore remain longer than in the lower teeth. We mention this in passing, lest the reader should be misled, if he should by chance refer to the indications given by the upper teeth to corroborate or cor-

rect any opinion as to age, about which he may be in doubt from the appearance of the lower jaw.

Occasionally the dentine on the side of the infundibulum may become stained and even black, and in such cases something like a double mark may be observed. An instance of this peculiarity is shown in the eight-year-old mouth.

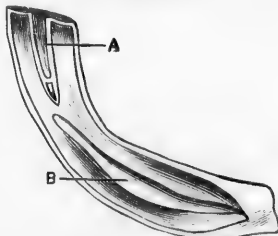
The mouth taken as a whole is broader at seven years old than at any other period. After this it gradually narrows with age. In this respect the drawings, taken as a consecutive series, are in some degree at fault, as it was found impossible to get mouths of the required ages to form a perfect ideal series. Yet aside from the fact of natural differences in teeth of different animals they are correct.

THE FANG-HOLE OR SECONDARY MARK.

At about nine years old (see cut), in consequence of the wearing down of the teeth, a slight trace of



the fang-hole usually appears in the center teeth, and somewhat later in the other teeth. It is indicated by a slight discoloration of the tooth at



A, Infundibulum or Mark Hole.
B, Orifice in Fang or Root.

the above point. There is, however, no actual hole, because with advancing years the upper part of the original cavity has become filled up with a sort of

spurious dentine, which is more yellow than the true material, of which the body of the tooth consists. As age increases this indication of the fang-hole, which is sometimes called the "secondary mark," becomes rather more plain. It, however, affords no reliable data by which to judge of the age, and is only mentioned in this place lest the reader should mistake it for the remains of the infundibulum. The enamel, it will be remembered, is pearly white, whilst this mark of the fang-hole is brownish yellow. The position of the fang-hole is shown at B, mark hole at A. (See section of tooth.)

FURTHER CHANGES INDICATING AGE.

It will be seen that about nine the "marks" entirely fail us, and indeed after seven or eight they can hardly be said to afford any very reliable data.

From eight years old and upward the best indications of the age are given by the gradual alterations which take place in the shape of the teeth from wear and in the closing of the mouth.

The teeth originally are broad laterally at their upper surfaces, otherwise called their crowns or "tables," and thin from front to rear. They narrow gradually toward their necks and fangs. Hence, as their upper surfaces wear off, the teeth become narrower year by year. In very old horses there is often a positive interval between the teeth.

The gradual effect of wear in producing this alteration is fully shown on page 105, where successive portions of the upper surface of the tooth are represented as having been removed by the saw.

The amount of wear on the upper surface of the teeth is greater in the young mouth than it is afterward, because in youth the teeth meet more fairly than they do in after years. The rate of wear gradually decreases as years increase, because the teeth do not meet so directly, but on the contrary project more and more forward in something like two parallel lines. For example, a quarter of an inch will usually be worn off the surface between five and six years old, whilst probably not more than that quantity will be worn off between twenty and twenty-five years old.

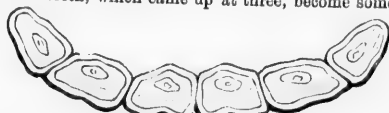
TRIANGULARITY.

A further very well-marked indication of increasing age is given by increasing depth from front to rear in the upper surfaces or crowns of the teeth. This increase of depth should be noticed and carefully compared. Further wear causes the crowns of the

teeth to assume a triangular form. The cause of this will be clearly seen on reference to the illustration of sawed portions of tooth. The teeth, though they diminish in lateral breadth, increase in thickness from front to rear all the way from the crown to the fang. This is shown in the illustration, page 105, removal of successive portions of teeth by saw, and coincides with shape of teeth of various ages.

At six and up to eight years old the teeth are all broad laterally at their upper surfaces. Up to this time the exact year is pretty well known by the "marks."

At nine, when the marks fail, the alterations in the crown surface or table come to our aid. The two center teeth, which came up at three, become some-



At Ten Years.

what triangular. At ten the two next teeth show similar signs. At eleven the corner teeth have become somewhat triangular. At twelve the triangularity has increased in all the teeth. This alteration continues to increase in all the teeth, until in very old horses the depth from front to rear exceeds the lateral width of the teeth. The next cut shows an average mouth at sixteen years old. The next figure represents the



At Eleven Years.

appearance at twenty. The next figure shows twenty-four; whilst the last figure may serve as a specimen of the teeth in extreme age. (Page 105.)

As age increases the teeth, notwithstanding they really wear down, become apparently longer. This effect is due to the fleshy parts of the gums receding faster than the teeth wear down. In extreme age, however, when the gums have receded as far as they can, the effect of wear causes the teeth to become visibly as well as really shorter.

SLOPE.

An alteration also takes place in the position or

"slope" of the teeth, as regards their closing. This is due to the effect of wear. The original form of the tooth is shown on page 103. (Section of tooth, A and B.) Its upper portion, it will be seen, is nearly perpendicular, whilst the lower part lies in a more horizontal position. Hence in youth the teeth meet



At Twelve Years.

directly, whilst in extreme age they can scarcely be said to meet at all. Their stumps project forward in two almost parallel lines. (See page 106.)

The various changes which take place in the position of the teeth in reference to their position or "slope" are shown in the full page of cuts, (106), figs. 1 to 4, and also the closing of the teeth as between the four-year-old horse and the one in extreme age. At two years old the gums are full, fleshy and prominent, and the teeth are nearly perpendicular. The gradual changes which take place in the slope with



At Sixteen Years.

increasing years are shown, perhaps, more clearly in the plates than could be explained in words.

Up to twelve years old there can scarcely be much difficulty in forming a pretty correct judgment as to the age. After that time it requires more time, prac-



At Twenty Years.

tice and opportunity than most people have at disposal to obtain the requisite knowledge.

It would probably scarcely interest the non-professional reader to trace very minutely the changes which take place after twelve years old. Suffice it to say, that the gums continue year by year to recede

the teeth become apparently longer and longer and really narrower, and consequently the intervals between them increase, and they project forward more and more in a straight line.

About twenty or twenty two, and in some instances a good deal sooner, the teeth, which up to this period have apparently increased in length, begin to grow visibly shorter, because the gums



At Twenty-four Years.

are so far absorbed that they can recede no further. Hence all further wear shows its effects by diminishing the length of the teeth.

LOSS OF CIRCULARITY.

In the very young horse the teeth are arranged almost in the form of a semi-circle. Year by year



Extreme Age.

this form decreases, until in old horses the teeth are arranged in something like a straight line.

THE TUSKS.

In horses, as distinguished from man, great assistance in determining the age is derived from the presence of the tusks, which are generally wanting in the latter. The tusks usually begin to appear in a very slight degree about three and a half or four years old. Their sharp points then just pierce the gums, and they continue to grow until fully developed about five or five and a half years old. They do not meet like other teeth, and therefore do not suffer from wear from that cause. They suffer, however, from wear in the course of mastication, and in fact undergo greater changes than any other teeth, and so form a valuable guide as to age.

The tusk is a very peculiar-shaped elongated tooth. Internally it consists of dentine, and is protected on the outside only by enamel. The enamel, however, overlaps the dentine, and hence arises the sharp edge or hook of the newly developed tusk, which may be felt if the finger be brought round it from behind.

The sharpness gradually wears off. After seven it has disappeared, and in each succeeding year the tusk becomes not only rounder and blunter, but its upper portion wears off. It also appears yellow, on account of the dentine becoming exposed by reason of the enamel wearing off its exterior surface. The tusks, unlike other teeth, do not apparently increase in length with years, but become shorter and shorter. In fact the effect of wear is greater on them than on other teeth, and it is also greater than the process of the receding of the gum. In very old horses the tusk is very little above the level of the gum. Mares sometimes have four small rudimentary tusks.

The alterations, which gradually take place in the form of the tusks, are shown in a series of cuts on page 106.

COLLATERAL CIRCUMSTANCES TO BE CONSIDERED.

In judging of the age of the horse by the teeth, every collateral circumstance requires to be taken into consideration, such as the form of the mouth, the way in which the teeth meet and close on each other, the food on which the animal has been kept, any irregularity in the upper teeth which may cause increased or diminished wear on the lower teeth, and also the habits of the horse in the stable. The teeth of animals which bite at the rack or manger whilst being cleaned, invariably present appearances of wear beyond their real age. The practice of filing and burning also may change the apparent age of the horse; Fig. 1 shows a real mark indicating age; Fig. 2 a simulated mark. The shape of the teeth and mark is different.



FIG. 1.



FIG. 2.

Real and Simulated Marks.

ing age; Fig. 2 a simulated mark. The shape of the teeth and mark is different.

The body also presents many indications of the age which may assist us in forming an accurate opinion.



Removal of Successive Portions of a Tooth by the SAW.

THE TUSKS.

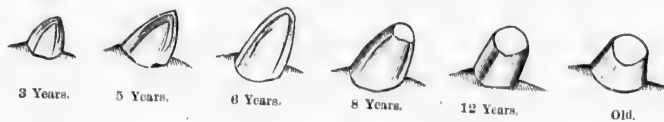


FIG. 1.—Five Years.



FIG. 2.—Six Years.



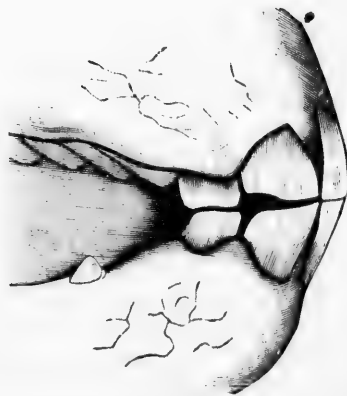
FIG. 4.—Eighteen Years.



FIG. 3.—Twelve Years.



Closing of Mouth and appearance of Teeth in Extreme Age.



Four Years Old. Closed.

ion, and sometimes may enable us to correct an erroneous impression produced by some abnormal appearance of the teeth. The young horse is fleshy about the gums and head, and the hollow over the eye is shallow. Year by year, as age increases, the gums lose their fleshiness, the head becomes more lean, and the hollow over the eye deepens. The shoulders lose much of their thickness and become finer, and assume an appearance of greater length. The hind quarters in like manner lose some of their roundness, and the animal generally gains an appearance of more breeding than he had in his younger days. The back becomes more or less hollow, a result partly due to the effect of weight, especially in long-backed animals, and partly to loss of fleshiness of the muscles which run along the spine.

Again, as the horse becomes old the fullness of the chin under the mouth disappears. The inferior margin of the branches of the bone of the lower jaw also becomes thin. Lastly, the general appearance of the aged horse is much influenced by the work he has done and the treatment he has received.

Age must not be judged by any one sign, but by a mean judiciously struck between all the signs, and by a careful consideration of all collateral circumstances. It never happens that all the signs combine together to deceive a careful and well-informed observer.

The reader will perceive that after six years old, *i. e.*, after the structural changes in the mouth are completed, it is impossible to lay down any one single definite rule by which the age can be ascertained. Still, with a little trouble and attention there is no real difficulty in acquiring a knowledge of the horse's age up to a comparatively late period of his life.

CHAPTER XIV.

DISABILITIES AND UNSOUNDNESS.

SECTION I.—WHAT CONSTITUTES UNSOUNDNESS.

That which does not or does constitute unsoundness is so often a question of variance, and is so important in view of the ever recurring tricks, subterfuges and deceits practiced by disreputable dealers and owners of horses, that we reproduce a list with notes of the several diseases and disabilities, not considered unsoundness in England, and those so considered, and which are received generally as correct.

DEFINITION OF UNSOUNDNESS.

The definition of unsoundness is, "the existence of disease or alteration of structure which does or will impair the horse's natural usefulness." Vice also may be defined, on a similar principle, as "the prevalence of a habit that interferes with the horse's natural usefulness." But these definitions must be taken with some modifications, for there is not one horse in a hundred which does not possess some disease or vice likely to impair his general usefulness to some slight extent; indeed, the proportion of strictly sound horses may be considered to be much smaller even than this. A bad feeder is so generally from a disordered state of stomach, and such a horse cannot stand work like one which will consume double the quantity of food, yet he would not be considered unsound; nor would a horse be returnable as vicious if he showed the usual symptoms of being "fresh," though they might impair his usefulness in carrying a timid rider. But subject to such modifications, the above definitions may be accepted as sufficient to make intelligible the terms unsoundness and vice.

SECTION II.—DISABILITIES.

The following diseases and accidents are generally considered not to render their possessors unsound:—

Bog spavin, in a slight degree only.

A broken knee, unless the joint is injured so as to impair its functions, is not considered to be unsoundness.

Capped hocks and elbows do not produce any lameness, nor do they in any way interfere with the action of the joints to which they are adjacent.

Contraction of the foot is no evidence of disease, and, taken by itself, is not sufficient to prove it to be unsound. English law authorities say:

Crib-biting was decided in the cases of *Broennenburg vs. Haycock* and *Scofield vs. Robb*, not to be unsoundness; but Baron Parker ruled in the latter that it came within the meaning of the word "vice." Undoubtedly this is a habit which is generally attended by impaired digestion, and, as such, it comes strictly within the definition given above; but the law is as I have stated it.

Curby hocks, though experience may tell us they are likely to be attended by curbs, are decided not to be unsoundness. In *Brown vs. Elkington*, the attention of the vendor was directed to the hocks by the purchaser before the sale, as likely to spring curbs;

but in the action on the warranty it was held by Lord Abinger that "a defect in the formation of the horse, which had not occasioned lameness at the time of sale, though it might render the animal more liable to be lame at some future time, was no breach of warranty;" and the Court of Exchequer confirmed this view of the law, by refusing a rule for a new trial.

Cutting, on the same principle, is no breach of warranty, unless the horse is lame from it at the time of sale.

A splint is not, in itself, evidence of unsoundness; but if it is so situated as necessarily to interfere with the suspensory ligament or tendons, or if it has already produced lameness, it is to be accepted as a mark of unsoundness.

Thoroughpin, when existing to a moderate extent, is not sufficient to render the horse unsound; but this will always be a question of opinion, and a horse with thoroughpin is, therefore, not to be warranted with safety.

Thrush, occurring from mismanagement only, and not from any defect in the horse, is clearly not to be considered as unsoundness.

Soreness of the joints from work, as it soon goes off after a short rest, is not accepted as unsoundness.

Windgalls are also only evidences of work, and do not usually cause lameness. When this coexists, it is sufficient to produce unsoundness, without resorting to the windgalls.

SECTION III. — UNSOUNDNESS.

The following list comprises the diseases and injuries which have been settled as sufficient to entitle the purchaser to return a horse warranted sound:

Bog spavin, when it is so severe as clearly to interfere with the action of the joint; and blood spavin, as marking an aggravated form of the same disease.

Breaking down, even though the horse is restored so as to run without lameness.

Broken wind.

Cataract, in any degree.

Corns, unless very trifling; but they should be discovered within a few days of the sale, or it may be alleged that they have been produced by subsequent mismanagement.

Cough, as long as it lasts. A horse with chronic cough is clearly returnable.

Curbs constitute unsoundness; but they must be shown to exist at the time of purchase, for a horse may throw one out immediately after he is transferred to the purchaser.

Diseases of the organic kind, in any of the internal viscera.

Farcy, incipient glanders, is mortally contagious, and of course unsoundness.

Founder, or laminitis, whether it produces lameness or not, if it manifestly has existed, is to be accepted as unsoundness; for when there is evidence of its previous occurrence, the laminae are injured so much as inevitably to lead to lameness when the horse is put to work.

Grease and glanders constitute unsoundness, and the latter may be contracted by man and is deadly.

Mange.

Megrims, when the attack comes on subsequently to the sale, and can be shown to have occurred before it.

A nerved horse is unsound from the existence of the disease for which the operation has been performed, as well as from the division of the nerves.

Ophthalmia, if it can be proved to have previously existed, and comes on soon after the purchase, is to be received as unsoundness. So, also, when any of the evidences of its previous presence can be detected, and are proved by a veterinary surgeon, the horse is returnable.

Ossification of any of the structures adjacent to the joints is unsoundness, and hence ossification of the lateral cartilages will be considered so, without doubt.

Puniced foot, as evidence of laminitis.

Quidding.

Quittor.

Ringbones, and sidebones, whether large or small, are undoubtedly sufficient to constitute a horse unsound.

Roaring, whistling, etc., as evidence of contraction of the rima glottidis, and therefore interfering with respiration.

Ruptures of all kinds.

Spavin (bone), although it may not have occasioned lameness, if it is clearly the disease so named. Stringhalt has been decided to be unsoundness (Thompson *vs.* Patterson, English Law Record.)

Thick wind, as marking some impediment to respiration.

Thrush, when it is in one of its severe forms, and not caused by mismanagement.

Thickening of the back sinews, or suspensory ligament, when existing to any extent easily appreciable, is to be received as a proof of unsoundness.

DECIDED VICE.

Returnable vices are comprehended in the following list:

Biting, when carried to any unusual extent.

Bolting or running away.

Crib-biting.

Kicking, when more than usual.

Restiveness, or refusal to proceed in the desired direction.

Rearing.

Shying, when marked.

Weaving in the stable.

When a horse is purchased, with the conditions that he is warranted sound, or free from vice, or quiet to ride and drive, the warranty must either be in writing, or given in the presence of a disinterested third person. The warranty is as follows, to be properly filled in, and it is better that it should be on the same paper as the receipt, though this is not absolutely necessary if it is shown that the receipt is properly given:

Date.

Received of _____, fifty pounds for a bay gelding, by _____, warranted _____ years old, sound, free from vice, and quiet to ride and drive.

\$ _____

SECTION IV.—HOW TO EXAMINE A HORSE.

Whether the horse under examination is to be warranted or not, the intending purchaser should never omit to look over every point where unsoundness is likely to occur. To do this effectually it should be done regularly, by which there is less chance of passing over any serious defect. The usual mode of proceeding is as follows: Under no circumstances, if it can possibly be avoided, should the horse be looked at immediately after having been out of doors; and if he is of necessity brought to the purchaser, let him be put in the stable and quietly rested for one or two hours at the least, by which time the effects of most of the "coping" tricks will have gone off.

Before the horse passes the stable-door, stop him with his head just inside, and in that position carefully examine his eyes. The light is exactly suited to this, and the sensibility of the iris may be well

judged of. Any specks or opacities are also here readily seen. Then let him be led to a level surface, and then proceed to look over every part, beginning with that nearest the one already inspected, namely, the mouth. Then "cough" him by tightly grasping the larynx, by which some idea may be formed of the state of his respiratory organs, after which the usual maneuver with the stick may be practiced if there is no opportunity of examining into his freedom from roaring in the saddle. When these points are satisfactorily disposed of, look to the position of the fore legs, that is, whether they are turned in or not, and if the latter, feel the elbows, and see if they are confined or "tied," that is, too close to the ribs; also look for marks of cutting and speedy cutting. Pass the hand down the back sinews and suspensory ligaments, examine the knees for any marks, and then carefully feel the coronets and heels for any marks of exostosis or ossification. Lastly, take a good look at the front of the foot, and then lifting it inspect the frog, heels and sole. This will complete the front half of the body, after which the form of the middle and loins should be regarded, and then, lifting the tail, the openness or otherwise of the space round the anus will give some idea of the strength of constitution, while the resistance afforded by the dock will be a sign of the muscular strength of the back. Then look carefully at the hocks, examine the spavin and curb places, and finish the whole by passing the hand down the hind cannon bones to the fetlocks, and feel them in the same order as in the fore legs. Now let the horse rest a minute if his groom will let him, with his head quite at liberty, and you will be able to judge of his ordinary habit of standing, when unexcited. At the conclusion of this careful examination while at rest, the action must be as minutely investigated, by first having the horse walk with a loose rein, and then trotted in the same way slowly, when if he is sound he will put his feet down regularly and firmly. Grooms, when they want to conceal defects, will not let the head be loose, nor will they trot slowly, but hurry the horse along with their hands as close as possible to the mouth, so as to prevent any nodding of the head as much as they can. A very good judge will be perhaps able to select a pleasant saddle or harness horse by seeing him thus run, and afterward ridden, but a far better test is to ride or drive him yourself, when his freedom from vice or disease

may be ascertained, as well as his manners, and the ease of his various paces. No trouble should be spared to get this real trial, which is worth ten per cent on the purchase money, for many a horse which looks to go well does not feel so, and it is well worth that sum to be saved the trouble attending upon the possession of a horse which does not suit. When, however, after such a careful examination by a competent judge, and subsequent trial in the saddle or in harness, the horse is found to be really likely to answer all the purposes for which he is wanted, ten or twenty dollars should never prevent his being obtained.

CHAPTER XV.

MULES AND ASSES AND THEIR BREEDING.

SECTION I.—DIFFERENCE BETWEEN THE HORSE AND ASS.

Horses, which constitute the genus *Equus* of Linnaeus, and are the sole recent representatives of the family Equidae, fall naturally into two sub-genera, first shown by Gray in 1825—*Equus* and *Asinus*.

The typical horses (*Equus*) are distinguished from the asses (*Asinus*) by the presence of warts upon the hind legs, as well as upon the fore legs, by their broad, rounded hoofs, and by their tails beginning to throw off long hair from the base, instead of having these hairs confined, as a sort of pencil, to the extremity of the tail. Up to a recent period all the wild species of *Equus* known to science were referable to the second of these sections—that is, to the sub-genus *Asinus*, known from *Equus* by the absence of warts or callosities on the hind legs, by the contracted hoofs, and by the long hairs of the tail being restricted to the extremity of that organ.

THE ASS AND HIS RELATIVES.

Of this group the best-known species, commonly called wild asses and zebras, are (1) the wild ass of Upper Nubia (*Equus tanius*), probably the origin of the domestic ass; (2) the wild ass of Persia and Kutch (*E. onager*); (3) the hemippe or wild ass of the Syrian desert (*E. hemippus*); (4) the kiang or wild ass of Thibet (*E. hemionus*); (5) the quagga (*E. quagga*), of South Africa; (6) the Burchell zebra (*E. burchelli*), of Southern and Eastern Africa; (7) the zebra (*E. zebra*), of Southern Africa. As already stated, these seven animals all possess the character of the second sub-genus *Asinus* as above given, and no recent species of horse referable to the first sub-genus (*Equus*) was hitherto known to exist

on the earth's surface, except the descendants of such as had been formerly in captivity.

A NEW WILD SPECIES.

The nearest approach to the domesticated horse, found truly wild, was by Przevalsky, who, on his return from his third great journey into Central Asia, brought back with him to St. Petersburg an example of a new species of wild horse, which belonged, in some of its characters, at least, to true *Equus*. This new animal was described in 1881 in a Russian journal by Mr. J. S. Poliatow, and dedicated to its discoverer as *Equus Przevalskii*.

Przevalsky's wild horse has warts on its hind legs as well as on its fore legs, and has broad hoofs like the true horse. But the long hairs of the tail, instead of commencing at the base, do not begin until about half-way down the tail. In this respect *Equus Przevalskii* is intermediate between the true horse and the asses. It also differs from typical *Equus* in having a short, erect mane and in having no forelock, that is, no bunch of hairs in front of the mane falling down over the forehead. Nor has Przevalsky's horse any dorsal stripe, which, although by no means universal, is often found in the typical horses, and is almost always present in the asses. Its whole general color is of a whitish gray, paler and whiter beneath and reddish on the head. The legs are reddish to the knees and thence blackish down to the hoofs. It is of small stature, but the legs are very thick and strong, and the head is large and heavy. The ears are smaller than those of the asses.

SECTION II.—WHAT IS A MULE?

A mule, strictly speaking, is a hybrid between two animals of a genus, but of a different species. The produce between the canary and the linnet are mules and so designated. The produce between two animals of the same species are not mules but crosses. The produce between animals of different species are rarely fertile. Those between animals of the same species are fertile together. They are properly termed crosses, or varieties. The produce between the white and negro race are termed mulattoes; that is, muled, but incorrectly. They are crosses.

CROSSES V. HYBRIDS.

In plants the same rule follows. The crossing of different species of the same genus are hybrids, those between plants of a given species are crosses or vari-

eties. Yet following the great law of nature to prevent the indiscriminate mixing of species, even varieties are less fertile than those of pure or uncrossed lineage. Hybrids of plants are, with very rare exceptions, infertile, and never permanently fertile.

Mules are so rarely capable of breeding, even in warm countries, that it is looked on as a great curiosity. Varieties and crosses are in fact partially infertile, even in a species so closely related as the black and white race, though the resulting cross may be more than ordinarily athletic and long-lived. In the case of mules, they are notably long-lived. Mule linnets live to the age of thirty or forty years, and the mules of the horse kind live to three times the age of the horse. This constitutes, in connection with their docility at labor, the chief excellence of mules, and the warmer the climate the more valuable do mules become.

SECTION III.—SPECIAL USES OF MULES.

It is from the fact that mules are strong, muscular, little liable to disease, long-lived and patient at labor, which has made them sought as beasts of burden and animals of draft since the days of the patriarchs. They are especially smooth and easy under the saddle, and anciently were much used for this purpose. Their use is now pretty much confined to the cultivation of the soil, and for use as draft animals on the road and in cities. In time of war as draft animals they are especially valued, from the little care necessary in attending them, the ease with which they may be trained, their adaptability to coarse fare, and endurance of hardship. It is a peculiarity, however, of the mule that they must be taught the precise thing they are intended to do. If changed from their usual work to that of another kind they are awkward until carefully shown what is expected of them, even though they may have performed similar work before. The horse, on the other hand, quickly accommodates himself to the changed conditions, yet never performs work that the mule is capable of so trustily as the last named animal.

The reason probably is that their higher intelligence causes them to be more cognizant of what is going on about them, and consequently they are more heedless of their work. The mule, for instance, once carefully trained to plow corn, follows the row, seldom stepping on the plants, even in coming about. They may be more easily driven with a

single line, or without lines, than horses, and in many other ways their superiority as drudges is evinced. Their special uses, therefore, is as draft animals in the country and city.

SECTION IV.—CLIMATES ADAPTED TO MULES.

The wild ass is more strictly an intertropical animal than the horse. In domesticity they never acclimate themselves to cold climates, and if not kept warm in winter become liable to rheumatism and other disabilities and thus worthless. So with the mule, its working value steadily decreases as we approach the north, far inside the limits where the horse successfully withstands the rigors of the climate. In cities where mules are warmly clothed in winter, they stand fairly well; but north of the latitude of 40 degrees we find the use of mules increasingly small, and as we go south proportionally greater. It is said that the reason is that they will stand the abuse of the negro help better than horses. The real reason is they will work in a summer heat to which the white man and the horse would quickly succumb.

On a farm in central Illinois, where some years ago we worked forty mule teams and six teams of horses, the horses would out work the mules in winter. In summer the mules would be happy in a heat that distressed the horses. When turned out together in hot weather, the mules would lie down broadside in the sun, while the horses would seek the shade. In the winter time we kept the horses steadily at work and the mules were kept loose in warm quarters, except such as must be worked. These were always kept more warmly clothed in the stables than the horses. In summer they were seldom distressed with the heat. Horses often were.

SECTION V.—HOW TO BREED MULES.

The successful breeder of mules must therefore pay especial care to the comfort of the animals. Years ago we bred mules near Chicago. For the reason stated in the preceding section it was unprofitable, except in the sense of getting experience. Hence mule breeding is confined to Missouri, southern Illinois, Indiana and Ohio, Kentucky, Tennessee and regions south. In the breeding of mules there must be no guess work. As much intelligence and care must be used as in the breeding of horses. It should be unnecessary to say that there is never profit in the breeding of mules from undersized jacks and small, inferior mares.

A BREEDER'S EXPERIENCE.

A southern gentleman well versed in mule raising, writes as follows upon raising mules:

"In the famous blue-grass region, which spreads over a large portion of the great basin styled the valley of the Mississippi, the well-selected jacks and jennies have been almost naturalized, and under the influence of abundant food and a suitable climate, with judicious care and skill in their breeding, they have really improved upon our hands since their introduction among us; and the American mules, many of which may claim high blood on the side of their dams, will compare most favorably with those of any other portion of the world. In the mule we have the size and activity of the horse, combined with the form and hardihood of the ass, while he surpasses both his parents in sure-footedness and in longevity, and has more endurance and greater power of recuperation from fatigue and exhaustion when excessively worked. Well-bred mules are as spirited, and equally active, or even quicker than horses, if perfectly broken. They will walk fast, and in the draught they pull even more steadily. Their intelligence is so great that they may be trained very readily either to the line or to the word, and many splendid, large teams are driven, even over rough ground where there is scarcely any road, perfectly guided by the voice of the teamster, aided only by the loud crack of his whip, which they understand as a sound of encouragement rather than as an intimation of impending torture.

SELECTION OF THE JACK.

"In breeding, the selection of the jack is of the first importance. Great improvement has been made in the mule since the introduction of the Spanish jack into this country, which has resulted in giving us animals that come to maturity earlier than the old Maltese stock, besides having more size and better action. In the production of mules the jack should be from fourteen to fifteen hands high, with a good length of body, depth of chest, and with a round barrel, as indications of a good constitution. He should have heavy, flat-boned limbs, a long, thin face, with fine, thin under jaw bones. His ears should be carried upright, and they must not be too thick. The animal should have a sprightly temper and appearance, as these qualities will almost always be transmitted to his progeny.

"The jack must be fed with a view to the main-

tenance of the greatest physical vigor, so as to produce an even lot of colts, and to this end he should rarely be allowed to serve more than fifty mares during the season of three months. He should be provided with such food as will give him strength without producing feverishness. Natural exercise, with the freedom of the grass lot, should always be allowed, when practicable. Animals designed for crossing with mares should be kept from any intercourse with their own kind, as they often become entirely useless for cross-breeding when allowed contact with their own species.

"For the production of mules, mares should be selected that have large, roomy bodies on short, strong limbs. They should have good, sprightly tempers, and, when attainable, the more they have of cross with the thoroughbred horse, the better, if the above requisite of form and strength shall have been preserved.

"A horse should always be used as a teaser to try if the mare be in season, because mares will often allow the jack to serve them after having been teased by a horse, when their natural timidity would have caused them to refuse any approaches by the jack without such preparation. Moreover, it saves the jack from an undue excitement in trying to overcome the antipathy which some mares have to the very sight of him. Mares should be bred to the jack early in the spring, so that the colts may have sufficient age before winter sets in. Besides, if they are all weaned at the same time, they will have the advantage of beginning their feeding alike, and they will remain more uniform during the winter."

SECTION VI.—TREATMENT AND TRAINING.

Mules are timid animals, possessing also a great amount of curiosity in their composition. Affection strongly characterizes all their actions; but they possess a peculiarity unusual in most domestic animals, that of resenting any injury. From this circumstance they have received the credit of viciousness and stubbornness, which, by a proper study of their characters, and by proper treatment from the beginning, can, in most cases, be overcome. It is much easier to train up a mule in the way in which it is to go, and to fit it for the purposes for which it is intended, than to overcome any bad propensity arising from years of mismanagement. Hence mules are often bought as colts by middle men, called feeders, who rear them for sale. Therefore, upon the

collection of the colts at weaning time, they should be placed in an enclosure from which there is no possibility of their escaping until they have forgotten their dams. By this means the first step is taken to prevent the formation of one of their mischievous propensities—that of being “branchy.” At all times one should move among the colts quietly, and without evincing any outward manifestations of fear, and in this way will soon gain their confidence, and, after a very few days, the feeder will be in perfect safety from injury.

If during the first summer any of the colts should have been taught unruly tricks, care must be taken to avoid receiving harm from them; and before many months, if they be kept away from the bad associations, the tricks will be forgotten.

Feeders succeed best when the colts are collected about the same time, early enough for them to become accustomed to the change of food before the setting in of cold weather, and late enough to avoid the great annoyance and injury which young stock suffer from the flies.

The period usually considered best for gathering mules is from the 20th to the end of September. When the colts are collected and brought together in this way, they form mutual attachments which last until they are separated. They should be furnished with good pasture, and should be fed with grain once a day, which usually consists of oats, mill feed or green corn. If obliged to confine them when first collected, green corn cut up with the stalks should be given frequently in small quantities at each time, so as to entice them to eat, and encourage their appetites. This may be alternated with dry oats or mill feed. A constant supply of pure water is very desirable; for, though the mule is capable of enduring greater irregularities in feeding and vicissitudes of the weather than the horse, still success in feeding depends upon having food and water convenient and accessible to the stock. When these arrangements are properly provided, the mule is a very light feeder; but he wants a little often, and should be furnished a variety of food, so that he may partake of it according to his fancy.

Many prefer a wood-lot for wintering their mules, if the ground be firm and dry, and not liable to become too muddy. They assert that the mules are less likely to suffer from colds and coughs, which run into distemper, than when confined to stables or sheds.

FEDDING.

At all times their food should be given in such proportions and of such nature as to insure a free passage from the bowels; for constipation brings on fever, as well as colds and distempers, which is a very prevalent disorder among colts during the first winter; hence the importance of taking care to work it off with loosening food. Corn is the great food for all kinds of stock in the west; but young colts require a portion of their food to be of a more digestible character, producing more growth of muscle and less fat; therefore, after the grain has become hard and the stalks have dried, the colts should be provided with wheat bran mixed with corn meal, or the richer kind of offal from wheat, generally sold by the millers as “middlings;” and for the “roughness,” as we term it, give them all the clean wheat straw or corn fodder they will eat, with an occasional change to clover hay. Colts will consume an average of about six or seven pounds of middlings feed each day through the first winter. If there be a tendency to constipation, unthreshed Hungarian grass, cut when the seed is nearly ripe, is the best food to relieve the difficulty. A portion of this hay placed where the colts can have easy access to it, insures a good state of the system, and many feeders find it to be invaluable.

Salt mixed with ashes in equal proportions, should be placed under shelter, where it can be at all times accessible to the colts, for nature will direct them as to the quantity and periods when it should be consumed, and if given in this way, it will never be taken in excess.

If colts be stabled, care must be taken to provide clean, dry bedding, and if their feet become diseased, as is frequently the case, where they are exposed to wet, a strong solution of sulphate of copper in vinegar, applied after a thorough washing with soap-suds, will almost always effect a speedy cure. This disease must not be neglected, for if it be allowed to continue, the general health of the animal will suffer, and its hoofs becoming deformed, the value of the mule will be very greatly depreciated.

Castration is done by many breeders during the first summer, while the colt is still with the mare, but it is more commonly postponed until the animals are approaching one year old and before they are turned out to pasture. The operation is performed in the same manner as with horses. Castration

should be done before the flies are troublesome, and the colts should not be allowed to roll in the dust for fear of obstructing the free discharge of the suppuration.

GENERAL CARE.

During the summer the care of the stock consists in regular salting, and the occasional trimming a hoof that may have assumed an unnatural proportion of length or shape, which by a little care may be rendered straight and perfect. A month of feeding on grass alone through May, purifies the system from the humors that may have arisen from colds and distempers, and have been continued in the blood in consequence of high feeding with grain. After this change of diet has produced its effects, a regular feeding of grain with the grass, has the advantage of a tendency toward early maturity; for in mule raising it is a maxim, that what is gained in time is saved in the amount of food consumed. Besides this, grain fed during the fly season insures a constant and regular growth, which is so desirable that it should always be obtained if possible.

By the 1st of September, yearling colts are very apt to be restless, and if the enclosures are not very good, they will become breachy; it is therefore best at that period to put them up for their regular fall and winter feeding. The stock should be placed in a small lot or open shed and fed with whole corn in deep wide troughs, which should be four feet across and eighteen or twenty inches deep, and raised from the ground so that the sides shall be three feet high. The stalks may be thrown into these troughs as they come from the field; or the fodder may be cut up, and may be continued as long as the stalks are soft. After this, if stabled, they should be fed with corn from the shock, with the addition of mill feed each day. Besides this, Hungarian grass and wheat straw should at all times be kept within their reach for the sake of providing a variety of food, for the greatest success depends upon keeping up a good appetite by constant, regular feeding.

During the second summer, if soiling be practicable, a large amount of food may be saved by adopting this plan, for at this age mules are very restless and uneasy, and are constantly roving about, and thus destroy more food than they consume.

By giving them a regular feed in a good lot which is sufficiently large for exercise, they will make a better growth and are less liable to the injuries to

which they are incident when running in the pastures. Grain or mill feed should be provided, at least through that part of the summer when flies are troublesome, if not, indeed, throughout the season; otherwise, they will not consume enough food to keep them in good condition.

The second winter the same treatment is required as in the first, but as they are older, corn alone will answer for their food, because it is desirable to push them forward for an early market when they have become two years old.

During this period it is necessary to watch their feet carefully, because while we are pushing the animal to an early maturity the lower part of the hoof is often disfigured, because its growth is in excess of the wear, and will require to be pared off.

SECTION VII.—TRAINING TO LABOR.

In breaking mules for farm use, it is best to begin when they are coming two years old, and by using them at light work during the third year they will have a quicker step than if they were allowed to attain their full maturity and then set at once to heavy work.

The first lesson for the mule-trainer, before attempting the management of these animals, is to learn to govern himself; and the sooner the barbarous custom of choking a mule almost to suffocation is abolished the better. By this treatment the animal suffers a shock, both mental and physical, that in many cases injures the constitution of the animal without conducing to its proper training.

The mule should be led or driven into a confined stall or stocks, from which he cannot by any possibility escape; in a very short time he will cease struggling; gentle handling with quiet, soothing words will soon give him confidence when the gears or harness may be put upon him. The company of his mate, if he have one, or the presence of another animal, with which he is to be worked, aids in alleviating his fears. Avoid the possibility of his breaking away when released, for success depends upon the result of this first effort and the impression made upon him. After being hitched to the wagon the trainer should endeavor to repress too great eagerness in the animal, lest, by being overtaken, he become discouraged. By kind treatment mules may be rendered the most docile and affectionate creatures among our domestic animals, and will often

show more intelligence in some respects than the horse.

CHAPTER XVI. PARASITES OF THE HORSE.

SECTION I.—FLIES AND MOSQUITOES.

Flies are among the most distressing torments of all our domestic animals, and of none more so than the horse. In all the prairie regions of the west stock must be fully protected from them, by covering or other means, as to the working teams, and pastures must be provided with dark shelter where the stock may retire during the heat of the day and when the weather is sultry and dull.

EAR FLIES.

In the openings and about groves the little black ear flies, or deer flies, as they are called, are particularly annoying, being especially poisonous. As a guard against these the head and neck must be especially protected, since they render active, nervous horses frantic. The many preventives said to ward off the attacks of flies and mosquitoes we have found not practically available. There is but one sensible protection against either biting flies or mosquitoes. That is to fully cover the animal with thin clothing. The cost for a team will be repaid in a week's use. The little black house flies which appear late in the summer are equally distressing as the earlier ones, and the same means of protection must be used against them.

SECTION II.—SKIN PARASITES, LICE, ETC.

It should be unnecessary to write upon lice and all that class of parasites sometimes infecting animals. They are the result in nine cases out of ten of want of cleanliness and care. It is true a stable may become infested from strange animals being kept there or from lousy fowls roosting near. Yet this again may be prevented by care. If a stable becomes infested with poultry lousiness, or with the mange insect, it must be thoroughly cleaned. Take out everything having life; clean out all litter of every kind; thoroughly wash all surfaces and crevices with the dilute carbolic acid of gas works; then close all orifices tight and fumigate thoroughly with the smoke of burning sulphur or tar; afterward white-wash all surfaces with lime wash, thinned down with the dilute carbolic water of gas works.

MANGE INSECTS.

Mange is produced by a minute insect which bur-

rows in the cuticle of the skin. The test for mange is to scratch the mane at the roots, when the horse will stretch out his head and open his lips in the enjoyment of this relief.

The remedy is to thoroughly wash every part of the animal in warm carbolic soap-suds and thoroughly cleanse the animal with comb, brush and whisk when dry. Then make the following wash by measure: Animal glycerine, one part; creosote, one-half part; oil of turpentine, one part; oil of juniper, one-half part. It will require about one and one-half pints to be thoroughly worked into every



Mange Insect, Highly Magnified.

part of the horse's coat. Let two clear days elapse. Then again wash the animal with the warm soap-suds as before directed; keep in a warm place until dry, then again clean and apply the wash once more. At the end of two more days repeat the washing with soap-suds, dry and again clean. The person who attends the animals must not come near the others until fully disinfected, and every article used about the horses must be thoroughly cleansed and fumigated, and for the reason that mange is intensely infectious.

THE HORSE LOUSE.

To rid colts of the horse louse when found, a decoction of two ounces of stavesacre seed to a quart of water, applied to the infested parts when cool, will rid them of the vermin; but the animal must be so tied that it cannot lick the parts.

In ordinary cases two ounces of Scotch snuff, intimately mixed with six ounces of lard, will suffice. Rub the ointment thoroughly into all the affected parts.

The surest plan for destroying lice is a decoction of tobacco. It is apt to make the animal very sick if applied thoroughly, but it soon recovers and without serious consequences. A tobacco wash may be made by steeping two pounds of rough tobacco in three gallons of hot water for two hours. When cold apply with a sponge so as to thoroughly wet the skin. If nits are present a second application at the end of two days may be necessary.

We have classed mange among the external parasites. These insects, as heretofore stated, do really burrow in the cuticle, and one species rather deeply. The same may be said of the itch insect in man, but they are all cured by external applications, as is the scab insect in sheep.

ABOUT EXTERNAL PARASITES GENERALLY.

All animals are subject to lice, and every genus has particular species. There are three mange insects. Two, *dermatophagus equi* and *dermatocoptes equi* burrow on the surface and are more easily destroyed than the species *sarcopites equi*. This latter burrows in the deeper layers. Lice, on the contrary, live on the surface. The true lice infesting the horse are the hen louse, the blood-sucking louse of the horse and the bird louse. They are all called acari, and the hen louse approaches nearer to the contagious mange insect than either of the others.

RING-WORM.

There is another parasite disease of the skin, ring-worm, caused, not by an insect, but by a fungus (vegetable parasitic growth), which arises from bad care and bad feeding. It is contagious, and when found no time should be lost in eradicating it. There are two forms, the common ring-worm and another which forms the scab in the center, after the ring has receded. The best means of eradicating is to wash the part thoroughly in suds of carbolyzed soap, and then to paint the part with iodine.

SECTION III.—PARASITES UNDER THE SKIN.

The only parasite we know which hatches and matures under the skin is the larvæ of the horse gad fly, common in England, but rare in this country. A gad fly is common in cattle and their work produces warbles. The egg hatches, burrows under the skin, while it grows, living upon the pus formed, changes to the pupa state, and emerging becomes the perfect insect. A lump is formed over the habitation. When found squeeze the part strongly between the two thumbs. If the breathing hole is too small it may be enlarged with a lancet or knife blade, so that under pressure the larvæ will "pop out." The gad fly is not largely found in pastures, and is more prevalent south than north.

SECTION IV.—INTERNAL PARASITES.

The internal parasites of animals, occupying the stomach and bowels, are many, but instead of being a positive injury, they are now known not to interfere with the animal economy seriously, except they be of

the migratory kind, as trichinæ of swine, liver and kidney fluke of sheep, etc., always difficult to manage, even by the professed veterinarians. If suspected competent advice should always be sought. Bots, the tape-worm, and intestinal worms, may all be treated by the farmer when they occur in such numbers as to require attention.

BOTS.

This is the larvæ of an insect which lays its eggs upon the hairs of the legs and flanks of the horse, from which they are licked and swallowed. They attach themselves to the coats of the stomach, and unless present in such numbers as to interfere with the assimilation of food by the horse, they do no injury. Rubbing the eggs off by hand, or clipping the hair of the parts is a preventive. Their presence is known by the horse turning up his upper lip, in the spring, and by the edges of the tongue appearing red and fiery. Another species of bot fly deposits its eggs on the hairs of the lips and under the jaw, from whence they drop into the food and are swallowed. Animals kept in the stable are not subject to bots, unless they have run to grass the previous summer.

The insects resist alike strong acids, alkalies, narcotics and mineral poisons. When nearly grown they may be expelled by giving one drachm of sulphate of copper daily for three days. At the end of this time give four drachms of aloes. Repeat both prescriptions at the end of a week, if necessary. From what we have stated it may be remembered that bots cannot be expelled by strong medicines, during the growing state. When mature they let go their hold of the stomach and pass off naturally.

TAPE-WORMS.

Three species of tape-worm have been found in colts, and also in full-grown horses. Every link of the tape-worm is a distinct creature and capable of propagation. The eggs are found generally in the feces of canine animals. When these are deposited on pastures they may be taken with the grass. Probably the following is as good a vermifuge for tape-worms as any:

For a full grown horse pour three quarts of water upon one pound of quassia chips. When cold strain, divide into four doses for the full grown horse. To a dose add four ounces of turpentine, blended with yolk of egg, to cause it to mix, and add one scruple of powdered camphor. Give a dose each day for four days. The proportional dose, according to age

of animal, of turpentine and which will apply to the other ingredients, is as follows: Colt, a foal, two drachms; colt three months old, half an ounce; colt six months, one ounce; colt one year, one ounce and a half; colt two years, two ounces; colt three years, three ounces; colt four years and upwards, four ounces.

The small intestines of the horse are sometimes infested with a large worm (lunbrici) which sometimes enter the stomach. When present in considerable numbers the horse will be found to rub his nose. The appetite will be ravenous, and a whitish exudation will be found at the anus. The best general vermifuge is in the following formula: Sulphate of iron, one drachm; tartar emetic, one drachm; linseed meal, two drachms. Mix, form into a ball with molasses and give a dose morning and evening for a week. At the end of that time give at one dose, spirits of turpentine, one ounce; raw linseed oil, one pint. If necessary repeat the whole formula at the end of three or four weeks.



Lunbrici or intestinal worm,
1/4 usual size.

PIN-WORMS.

The small pin-worms may be ejected in the same way, but they lie so low, often in the last bowel near the anus, that they are better met with injections. The following will be a good injection, to be repeated every day for a week: Oil of turpentine, two drachms; raw linseed oil, one pint. It will be better to aid the injection with a purgative given on the fourth day. Form into a ball, with molasses, the following: Sulphate of iron, one ounce; aloes, four ounces. The pin-worm is less than one-fourth the size of the intestinal worm.

CHAPTER XVII.

COMMON DISEASES AND TREATMENT.

SECTION I.—CONTAGIOUS DISEASES.

Contagious diseases are those that may be spread by the contact of one infected individual with others. We have already treated of mange, a parasitic infection. The principal contagious diseases to which the horse is liable are glanders, bud or button farcy, charbon or malignant typhus, and strangles or colt distemper.

GLANDERS AND FARCY.

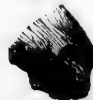
Either of the two first, glanders or button farcy, once established, the only thing is to kill, bury deeply, and thoroughly disinfect every portion of the stable, and to burn all clothing. There is no known cure, and the disease being communicated to man is more quickly fatal than in the horse.

THE TEST FOR GLANDERS.

The sure test for glanders is shown in the opened nostril of the horse, given in the cut, showing the ulcerous spots on the membrane. The primary discharge, early in the disease, is a thin, watery flow from one nostril; later, while retaining its clear appearance, it becomes of greater consistency. Then it changes to bad pus, from suppuration. The smell of glanders is less pungent than that of gleet, but more sickening, and it is deadly. When the disease has progressed as we have shown, it soon terminates in general ulceration and death. We have also described the incipient ulceration in the nostril. If glanders is suspected, the state veterinarian, if there is one, should be sent for at once. If there is none appointed send for a thorough veterinarian. Avoid quacks and their cures. There is no cure. The same remarks will apply to farcy.



Farcy Buds on Inside of Thigh.



The Secondary Stage of glanders.

CHARBON—SPOTTED FEVER OR MALIGNANT TYPHUS.

In its malignant form charbon is infectious. It is loathsome and quickly runs its course. Fortunately it is rare in the United States. It is supposed to be caused by blood poisoning, and usually follows pneumonia, influenza, catarrhal fever, etc. The form exhibited in cattle, sheep and swine is more serious than in horses and the disease should be treated by a competent veterinarian.

STRANGLES OR COLT DISTEMPER.

In its light form strangles is not serious, but yields kindly to good nursing, warm clothing, hot fomentations or poulticing of the parts, with, in addition, an ounce of saltpetre in the water daily. Rather soft but nourishing food should also be given. In its malignant type nursing and supporting the strength of the animal are absolutely necessary to success.

There must in no case be given purging or lowering medicines. In fact the whole treatment consists in producing and favoring the discharge of the abscess. It is the worst possible thing in its early stages to try and "scatter" it. It is apt to result in blood poisoning.

In the early stages of the disease the animal is dull and has a slight cough. There is running from the nose and mouth, quickened pulse and rapid breathing. In its more alarming type the swelling is rapid and serious, with filling of the mouth and throat, and often symptoms of strangulation, added to great difficulty of breathing, with loud blowing and much distress.

As a stimulant for simple strangles the following will be found good:

Spirit of turpentine,	2 parts.
Laudanum,	1 part.
Spirits of camphor,	1 part.

Apply this three times a day with a brush until soreness is produced. In the intervals keep the



Eight Tailed Bandage.

parts warm with flannel held in place by means of an eight-tailed bandage. If the swelling rise kindly it may be lanced, when you can plainly determine that the pus has formed, by the fluctuating feeling



Fastening of the Bandage.

under the skin. But unless it is painful let it break itself. If the bowels are costive relieve with injections. (*Give no purgatives*). Tepid water or salt

and water of a temperature of ninety-six degrees will do. During convalescence cod liver oil, three to four ounces at a dose, twice a day, may be given. Or if then there is a tendency to scrofula, give the following:

Cod liver oil,	2 ounces.
Iodine,	20 grains.

Shake thoroughly in a pint of new milk and give before the food twice a day. If the ulcers are not real, and show proud flesh, touch them with lunar

caustic, or apply powdered burnt alum. Or, if preferred, the part may be dressed with the following:

Iodide of mercury,	1 drachm.
Lard,	1 ounce.

Grind thoroughly, spread as a plaster, and apply. When the strangles are malignant apply to a competent veterinarian, since the complications require definite knowledge and special treatment.

SECTION II.—EPIDEMIC DISEASES.

Epidemic diseases are those pervading a wide extent of country, the infection being supposed to be in the air or due to atmospheric causes. If confined to a locality it is said to be epidemic. Influenza, for instance, may be endemic, or when spread over an extensive region of country it may be epidemic.

INFLUENZA, PINK-EYE OR CATARRHAL FEVER.

The general symptoms are: Weakness and stupidity; local swellings; heat and pain in the limbs; loss of appetite; rapid wasting; every part of the body is diseased. The following symptoms are somewhat uncertain: Pendulous head; short breath; inflamed membranes; swollen lips; dry mouth; enlarged eyelids; copious tears; sore throat; tucked-up flanks; compressed tail; filled legs; big joints; lameness and hot feet. Auscultation (listening at the chest) may detect a grating sound at the chest, or a rattling or rumbling sound immediately within the windpipe. When the last is audible there is always a copious discharge. Sometimes one foot is painful; purgation has been seen, but constipation is generally present, and the horse usually stands throughout the disease. Always suspect influenza when it is in the neighborhood, and the membranes are yellow or inflamed.

TREATMENT OF INFLUENZA.

In pink-eye, or epizootic, as it is sometimes called, its serious epidemic form, besides the general symptoms noticed, the pulse will be quick and weak—fifty to sixty per minute. There will be a short, dry cough and hurried breathing. The pulse later will rise to eighty or ninety per minute, the breathing to forty or fifty per minute and the temperature of the body will reach to 104 and 105 degrees Fahrenheit. Warm clothing, soft, nourishing, cooked food, the most careful nursing, and a warm well ventilated stable will be worth attending to if you would save your horse.

Every horse in the stable or on the farm is liable to be attacked. If possible send for a veterinarian.

If not, avoid all depleting medicines. Sustain the strength by all possible means. If the bowels refuse to move, give injections of warm water or linseed oil. Tonics and stimulants are good. A good tonic would be:

Carbonate of ammonia,	2 ounces.
Powdered gentian,	2 ounces.

Mix with linseed meal and molasses into eight balls. Give one night and morning. If the cough is distressing prepare the following:

Extract of belladonna,	$\frac{1}{2}$ ounce.
Powdered opium,	2 drachms.
Powdered camphor,	3 drachms.
Powdered licorice,	2 ounces.
Molasses,	$\frac{1}{2}$ pint.

Mix thoroughly and smear a spoonful well back on the tongue twice or three times a day with a smooth wooden spatula. A proper anodyne and soothing draught will be composed of

Sweet spirits of ammonia,	2 ounces.
Solution acetate of ammonia,	2 ounces.
Extract belladonna,	1 drachm.

To be given in a pint of water as may seem to be needed.

Only soft, nourishing food should be given, and it will be a good plan to dissolve half an ounce of salt-petre in a pail of water once a day for drink. If necessary this may be increased to an ounce. To allay the cough, sore throat and catarrh give as a dose, two or three times a day, the following:

Iodine,	20 grains.
Iodide of potassium,	1 drachm.
Sweet spirits of nitre,	2 ounces.
Water gruel,	1 pint.

If good nursing is given, and the air of the stable is kept pure (free from stable and animal odors), there should be small loss from the epizootic. Recovery is sometimes slow, and complicated with several local affections. These must be met if they occur. All catarrhal diseases and all colds may become epidemic. As a rule, however, they are local in their character and will be treated as such. The series of cuts show the magnified fungus forms found in the mucus of a horse with influenza. See Figs., 1, 2, 3, 4 and 5, page 120. The figures relate to specific conditions not interesting to the general reader.

SECTION III.—GENERAL DISEASES.

We propose only to designate some diseases of which horse owners can understand the symptoms, and carry the animal through to a permanent cure. We place pneumonia or inflammation of the lungs first,

and for the reason that simple cases may be treated; but in this, and indeed every serious disease, a veterinarian should be consulted if there is a competent one near.

INFLAMMATION OF THE LUNGS.

Whatever may be the cause of inflammation of the lungs, or pneumonia, hard driving and a sudden chill after, or any of the various causes that produce it, congestion is followed by inflammation. The disease must be promptly met. The earlier symptoms are rapid pulse, seventy or eighty beats per minute, temperature high, 103 to 104 or more degrees, according to the violence of the attack. The breathing is not rapid at first, but as the disease progresses it increases in rapidity. A sure sign of pneumonia is detected by applying the ear behind the shoulder (called auscultation). Healthy lungs give a soft, murmuring sound. In pneumonia there will be a fine crackling sound, like the indistinct rustling of silk. So also when the disease has progressed so as to more or less fill the lungs, instead of the resonant sound heard in health, upon tapping the chest with the back of the hand the sound will be dull. These are sure signs of pneumonia.

Professor Williams has given such careful rules of action in pneumonia that we reproduce them. They are as follows:

Place the animal in a well ventilated loose box, but where the air is not too cold.

Clothe and wrap the body, extremities and head in suitable, but not too heavy cloths.

Give it as much water as it will drink, adding to the water, if there is much fever, about an ounce of nitre or 20 or 30 drops of tincture of aconite to the bucket full.

If the bowels are bound, loosen them by injections of oil or warm water.

If there is much weakness, give two drachms each of carbonate of ammonia and camphor, in the form of a ball, twice daily.

Let the food be simple, laxative, cooling and nutritious, as bran, boiled linseed meal, good hay, or cooked carrots or turnips.

If moderate diarrhoea or profuse staling come on they are on no account to be checked, as this is an effort of nature to throw off the disease.

If there is great exhaustion, moderate doses of whisky may be given, but there is no use of pushing them, unless their good effects are soon seen.

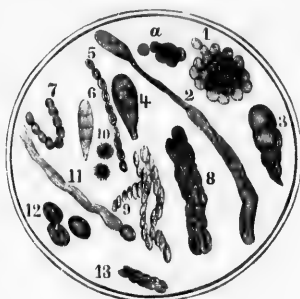


FIG. 1.



FIG. 2.



FIG. 5.



FIG. 3.



FIG. 4.

(A gill of whisky in a pint of water is a moderate dose, to be increased to half a pint if necessary.)

To reduce febrile symptoms in the early stage of the disease, the following will be indicated, repeating every two hours until the fever abates:

Sweet spirits of nitre,	1 oz.
Solution of acetate of ammonia,	6 oz.
Rain water,	6 oz.

Later, if there is a strong pulse and great oppression of the lungs, give every two hours, commencing with the least dose, twenty to thirty drops of tincture of aconite in water; or, give one or two drachms of tincture of veratrum in water every two hours. But as soon as their depressing influences are noticed in the pulse, sweats, trembling and anxious eye, discontinue at once.

COUGHS, COLDS, CATARRHS, SORE THROAT, ETC.

All this class of diseases are relieved by good nursing and simple remedies. A cough is one of the attendants of all affections of the throat and lungs and should be treated accordingly.

A cold in the head is catarrh. The symptoms are sneezing, running at the nose and eyes, with redness of the eyes and lining membrane of the nose. There is slight fever, weakness and dullness. The discharge is thin and colorless at first, but later becomes yellow. In the chronic stage the discharge becomes offensive. The remedy is to place the animal in a well ventilated stable, and keep warmly clothed in winter, and in summer free from irritation by flies. Give an ounce daily of saltpetre dissolved in the drinking water. Good nursing will generally effect a cure. As an assistant the following will be useful.

Extract of belladonna,	1 drachm.
Powdered camphor,	1 drachm.

Mix and make into a ball and give twice a day if necessary.

If the fever runs high give, in half a pint of gruel,

Spirits of ammonia,	2 drachms.
Ether,	2 drachms.

These remedies should be given each night and morning according to the symptoms. If there is a sore throat, it may be fomented with warm water, or apply a bread and milk poultice with a little mustard added.

For the discharge inject into the parts daily, for three or four days, of the following:

Sulphate of zinc,	2 drachms.
Tepid water,	4 pints.

As the symptoms abate, to improve the appetite, make into eight balls with linseed meal, and give one ball night and morning of

Carbonate of ammonia,	2 oz.
Gentian, powdered,	2 oz.

The injection recommended will be proper also in cases of nasal gleet.

BRONCHITIS OR CHRONIC COUGH.

The cough is at first dry and ringing, but later hoarse and loud. The animal is dull and listless, often with high pulse. There is thirst, the head is carried low and aropy mucus drops from the mouth. As a rule the bowels are constipated and the urine high colored. When the disease is likely to prove fatal the breathing increases rapidly, a bloody froth runs from the mouth, and the animal dies in convulsions. Sustain the animal's condition with good care, nursing and soft, nutritious food, so long as he can take it. While the cough remains ringing, give a full dose of opium, or preferably, say, one-half drachm, repeated every four hours until four doses have been given. Later, to soothe and relieve the cough, give three times a day the following dose, made into a ball with linseed meal:

Carbonate of ammonia,	1 drachm.
Powdered camphor,	1 "
Extract of belladonna,	1 "

Allay fever with half ounce doses of nitre in the water once or twice daily, or use sweet spirits of nitre in the water, say, two ounces, twice or three times a day. Relieve costiveness by injections of linseed oil, or tepid soap-suds.

CHRONIC COUGH.

As an external remedy, to be rubbed on the throat and windpipe once in ten days, use the following:

Croton oil,	15 to 20 drops.
Glycerine,	1 oz.

Sometimes a chronic cough is relieved by a blister on the chest. A fly blister, however, is not the best in this case; use the following:

Croton oil,	1 drachm.
Sulphuric ether,	10 drachms.
Alcohol,	10 "

Apply with light friction, so that it fairly enters the skin.

A chronic cough is sometimes difficult to deal with. Hence we give a number of formulas; if one fails another may reach the desired end. Prof.

William's prescription, in connection with a blister to the breast, is:

Prussic acid (dilute),	40 to 60 drops.
Nitre,	1 oz.
Bi-carbonate of soda,	1 oz.
Water,	1 quart.

Give this amount twice a day with careful nursing.

As a good solution to allay the violence of the cough, prepare the following:

Nitre,	4 drachms.
Powdered opium,	2 drachms.
Prussic acid (dilute),	1 drachm.

Mix in a pint of linseed tea and give half an ordinary tumbler full three times a day.

Another good mixture for chronic cough is:

Powdered camphor,	1 drachm.
Extract belladonna,	1 drachm.
Sweet spirits nitre,	2 oz.

Give in a pint of cold gruel several times a day.

It will be found useful in the earlier stages of cough and sore throat, especially when there is some fever.

In obstinate cough, give twice a day in a pint of rain water or milk, the following:

Solution of potash,	1 drachm.
Linseed oil,	2 oz.
Molasses,	1 oz.

Or give the following:

Tar water,	$\frac{1}{2}$ pint.
Lime water,	$\frac{1}{2}$ pint.
Powdered squills,	1 drachm.

SORE THROAT.

Inflammation of the lining membrane of the upper part of the throat or windpipe is usually accompanied with more or less fever, cough and difficulty of swallowing. It often runs into dangerous complications. It is called laryngitis when the larynx is affected, or pharyngitis when the pharynx is complicated, but when one of these organs is affected, the other generally is. When the disease has fairly taken hold there is difficulty in administering remedies. Hence the treatment should be prompt to be effective. In its acute and severe forms, the disease is dangerous. The symptoms are rapid and difficult breathing, the inspiration being longer than the respiration; the sound of the breathing is hoarse; the nose is protruded; the expression of the countenance is distressed; the eyes protrude and are watery; the cough is hoarse and rasping, the animal stamps his feet and is excited; the ears are cold and there are cold sweats on the body and legs. These are aggra-

vated symptoms. When these appear, the treatment must be prompt. Foment the throat with cloths wrung out of hot mustard water. It is better to send for a surgeon at once, since strangulation is apt to ensue, and tracheotomy, an opening through the neck into the windpipe, may have to be performed, for the insertion of a tube to breathe through. The animal may not be able to swallow, and then the following, to be smeared on the tongue, will be indicated:

Carbonate of ammonia,	1 drachm.
Powdered camphor,	1 drachm.
Extract of belladonna,	1 drachm.

Mix with molasses and lay it well back on the tongue from time to time.

Or take:

Powdered chlorate of potash,	4 oz.
Powdered guaiacum,	1 oz.
Molasses,	$\frac{1}{2}$ pint.

Mix, and lay some of it several times a day on the tongue with a wooden spatula.

If the animal can swallow, and is feverish, give, repeating three or four times a day, the following:

Powdered ipecac,	1 drachm.
Solution of acetate of ammonia,	1 oz.

Mix in a pint of cold linseed tea.

In the lighter attacks, if steaming the nose over a bucket of hot water is fought against, soak soft hay in boiling water, apply to the throat and fix with the eight-tailed bandage. The clothing must be warm, the legs should be bandaged and stimulated by friction, and plenty of gruel should be kept before the animal, and changed three times a day at least. The food, when the animal will eat, should be soft and succulent. Roaring, whistling, and various chronic complications arise from laryngitis. If chronic, the difficulty must be met by palliative means only. A useful embrocation for the throat, to be rubbed in daily, is:

Oil of turpentine,	Equal parts of each.
Solution of ammonia,	
Olive oil,	
Mix thoroughly by shaking before using.	

A medicine to be laid on the tongue several times a day, is:

Tincture of myrrh,	2 oz.
Camphor mixture,	4 oz.
Honey,	6 oz.

Stir all thoroughly together.

HEAVES, BROKEN WIND OR ASTHMA.

This is produced by bad food, chronic indigestion and a variety of other causes. Chronic, it is incurable, and the animal must be put only to slow, light work. The treatment must be palliative. It is caused by the rupture of the small cells of the lungs. Mild, recent cases may be cured by turning to grass where the animal has access to the rosin weed or compass plant or other resinous weeds of the prairies.

Dr. Law has been successful in the treatment of this disease with the following preparation:

Fowler's solution of arsenic,	1 oz.
Extract of belladonna,	1 drachm.
Tincture of ginger,	$\frac{1}{2}$ drachm.

Use as a drench, mixed in a pint of water, daily, for one or two months.

ROARING, THICK WIND, WHISTLING.

These are all incurable, being the result of other diseases.

Thick wind may be improved by giving a ball of the following once a day before feeding:

Powdered nitre,	1 drachm.
Powdered opium,	1 drachm.
Powdered camphor,	1 drachm.

Make into a ball with molasses and linseed meal.

The veterinary surgeon would treat many cases successfully, where the animal would pay the cost.

LOCAL INFLAMMATION IN AND AROUND THE MOUTH.

Dr. Teller, in "Diseases of Live Stock," has grouped and presented the following facts and treatment for various disabilities of a local nature:

"The general symptoms which indicate that a horse has some painful swelling in the mouth are a champing of the jaws, a return of his food to the manger without swallowing it, and a loss of condition in consequence. He is restless and uneasy, and sometimes there is a dribbling of saliva from the mouth.

"The principal forms of these inflammations, with their proper names and treatment, are as follows:—

"LAMPASS.

"An active inflammation of the ridges or fleshy bars in the roof of the mouth, generally occurring in a young horse while shedding his teeth; sometimes occurring in older ones from overfeeding.

"The 'bars' swell so much that sometimes they project below the level of the nippers, and are so tender that all hard and dry food is refused.

"The proper treatment is to scarify the bars with a sharp lancet; and should this not reduce the swellings promptly, they should be touched with the stick of nitrate of silver, or swabbed with a strong solution every day until they disappear. In this connection we here take occasion to impress upon horse owners never to allow burning of the mouth of the horse with the bit iron, for lampass or any inflammation of the surfaces. It is brutal and practiced only by ignorant quacks, or by persons misinformed of the true nature of the affection. Common sense will show to intelligent men that simple inflammation of the bars of the mouth, often produced from teething, or local causes connected with the teeth, is not assisted by the barbarous practice as shown in the cut.

"VIVES.

"These are chronic enlargements of the glands of the lower jaw, encroaching on the cavity of the mouth. They are liable to become tender and to discharge in the mouth.

"The treatment is by applying to the skin over where the swelling can be felt, an ointment of biniodide of mercury, one drachm of the biniodide to the ounce of lard, repeated daily until a free secretion from the skin is established. This will nearly always disperse them. Or they may be painted with tincture of iodine; or a tartar emetic ointment may be used, as:—

Tartar emetic,	2 drachms.
Olive oil,	1 drachm.
Lard,	1 oz.

Rub together the tartar emetic and oil until smooth, then add the lard. For a pustulating ointment.

"BARBS AND PAPS.

"By these and other names are known the swellings caused by obstructions of the ducts of the salivary glands. Their position indicates their origin.

"The treatment is by an incision over the swelling with a sharp pointed knife, or by holding a pencil of nitrate of silver against it every day for a moment or two. The horse should have a moderate dose of a laxative medicine (three or four drachms of aloes), and his food be changed for a time.



The Barbarous Practice of burning the Mouth for Lampass.

"TENDER AND BLEEDING GUMS.

"In young and scrofulous, and in quite old horses, it is not unusual to find the gums swollen, and to the touch soft, spongy and bleeding easily. Such horses have usually wide spaces between the teeth, which are found to be full of partly decomposed food.

"As the act of mastication is painful, the animal performs it imperfectly, which becomes visible in his deteriorated condition, as well as by an inspection of his dung, which will consist in part of half digested food. The breath is unpleasant and signs of indigestion are present.

"The matter lodged between the teeth should be removed every day with water and a properly constructed brush; afterward the parts should be washed with a solution of chloride of lime (an ounce to the pint). A spoonful of the following should then be smeared on and around the teeth:

Powdered chloride of potash, 2 drachms.
Honey or molasses, 2 oz.
Mix.

"The space between the teeth can then be filled with gutta percha filling.

"When, however, in very old horses, this condition is the result of natural decay of the processes of the gums, it can only be alleviated by cleansing the teeth and giving soft food of an easily digestible character.

"DECAYED TEETH.

"The teeth in the horse which are liable to decay are the molar or double teeth. The decay may attack the crown of the tooth, its neck or its fang.

"These may be briefly arranged as follows:

"1. Pain in eating as shown by 'quidding,' that is, throwing back from the mouth masses of half chewed food.

"2. Flow of saliva, 'dribbling' or 'slobbering.'

"3. Swelling of the gum, redness, and pain around the diseased tooth.

"4. Presence of a black spot upon it.

"5. Sharp pain when the tooth is smartly rapped.

"5. A fetid, sometimes excessively foul breath.

DISORDERS OF THE TEETH.

The only treatment is to remove the decayed tooth. Animal dentistry has not as yet gone far in filling to preserve decayed teeth. It has, indeed, been done the gutta percha filling being used; and there are reasons why, in a young and valuable animal, it would be far better than extraction; but to

fill the teeth properly is a delicate task; and if done improperly, the result is worse than removal.

The chief objection to extraction is that the corresponding tooth of the opposite jaw increases in length and becomes an object of serious annoyance. It must be periodically examined ever after, and when it encroaches beyond its neighbors it must be rasped back to their level.

TOOTH COUGH.

"Horses at four years old are very subject to a distressing paroxysmal cough. The animal will sometimes cough twenty or thirty times without stopping. The sound of the cough is loud, sonorous and prolonged.

"The cause of this cough is an irritation of the mouth, extending to the throat, brought on by the cutting of the sixth molar tooth, which is the one standing last in the row, and the replacement of the third temporary molar by its permanent substitute, both of which occur at this age.

"With the cough there may be associated some diarrhoea, indigestion and loss of condition from the difficulty in chewing the food properly, and the irritation it consequently causes.

"Treatment consists largely in dieting; hay, not much bran; grass, if in season. The mouth should be washed in some cooling mixture, as:

Borax or alum, powdered, 1 oz.
Water, 1 pint.

"Internally, a moderate laxative should be given if the bowels are disordered, so as to cleanse them from the half masticated food, and a daily dose of bicarbonate of soda, say one ounce, in the water."

INFLAMMATION OF THE BOWELS AND COLIC.

It is necessary to present these diseases together, since the symptoms of one must in no event be taken for another. These have both been stated so intelligently by Stonehenge, in "The Horse, in the Stable and in the Field," that we append them:

INFLAMMATION OF THE BOWELS.—PERITONITIS AND ENTERITIS.

There are two divisions of the abdominal serous sac, one of which lines the walls of the cavity, and the other covers the viscera which lie in it. In human medicine, when the former is inflamed, the disease is termed *peritonitis*, and when the latter is the subject of inflammatory action it is called *enteritis*. But though in theory this distinction is made, in practice it is found that the one seldom exists

without the other being developed to a greater or less extent. Veterinary writers have generally taken the nomenclature adopted in human anatomy and pathology, but in regard to the inflammations of the bowels they define peritonitis as inflammation of the peritoneal or serous coat, and enteritis as inflammation of the muscular coat. My own belief is, that during life it is impossible by any known symptoms to distinguish the exact *locale* of any inflammation of the bowels but that of their mucous lining, which will presently be described, and that wherever the actual serous covering of the bowels is involved the muscular fibers beneath it will be implicated, but that the serious and fatal symptoms manifested in such cases are not dependent upon the latter, but are due entirely to the lesions of the serous coat. I have examined numberless fatal cases of supposed enteritis, and have uniformly found signs of inflammation of the serous investment, sometimes implicating the muscular fibers beneath, and often extending to the peritoneal lining of the walls of the abdomen, but I have never yet seen marks of inflammation in the muscular tissue without their serous covering being affected to a much greater extent. I believe, therefore, that the distinction is erroneously founded, and that, theoretically, the same definition should be made of the two diseases as is in use by human pathologists, though, practically, this is of little importance. There is no well made out inflammation of muscular tissue (except that of the heart) in which the symptoms are so urgent and so rapidly followed by a fatal issue as in the latter stages of the disease described under the head *enteritis*. "The next stage," says Mr. Percival, "borders on delirium. The eye acquires a wild, haggard and unnatural stare—the pupil dilates—his heedless and dreadful throes render approach to him quite perilous; he is an object not only of compassion but of apprehension, and seems fast hurrying to his end—when all at once, in the midst of agonizing torments, he stands quiet, as though every pain had left him and he were going to recover. His breathing becomes tranquilized—his pulse sunk beyond all perception—his body bedewed with a cold, clammy sweat—he is in a tremor from head to foot, and about the legs and ears has even a dead-like feel. The mouth feels deadly chill—the lip drops pendulous, and the eye seems unconscious of objects. In fine, death, not recovery is at hand. Mortification

has seized the inflamed bowel—pain can no longer be felt in that which a few minutes ago was the seat of the most exquisite suffering. He again becomes convulsed, and in a few more struggles less violent than the former he expires."

In continuation Stonehenge holds: Analogy would lead any careful pathologist to suppose that such symptoms as these are due to some lesion of a serous and not a muscular tissue, and, as I before remarked, I have satisfied myself that such is really the case. I have seen lymph, pus and serum effused in some cases of enteritis, and mortification extending to a large surface of the peritoneal coat in others, but I have never examined a single case without one or the other of these morbid results. It may be said that so long as the symptoms are correctly described their exact seat is of no consequence; but in this instance it is probable that the ordinary definition of enteritis as an inflammation of the muscular coat may lead to a timid practice in its treatment, which would be attended with the worst results. I have no fault to find with the usual descriptions of the two diseases, or with their ordinary treatment, but I protest against the definition which is given of them.

An examination of the cause of inflammation of the bowels is the only means by which the one form can be distinguished from the other. If it has been brought about from exposure to cold, or from overstimulating medicines given for colic, the probability is that the serous covering of the intestines themselves is chiefly involved; while if it has followed castration it may generally be concluded that the peritoneal lining of the abdominal muscles has taken on inflammatory action by an immediate extension from the serous lining of the inguinal canal, which is continuous with it. In each case, however, the symptoms are as nearly as may be the same, and without knowing the previous history I believe no one could distinguish the one disease from the other—nor should the treatment vary in any respect.

The symptoms of peritoneal inflammation vary in intensity and in the rapidity of their development, but they usually show themselves in the following order: At first there is simple loss of appetite, dullness of eye, and a general uneasiness, which are soon followed by a slight rigor or shivering. The pulse becomes rapid, but small and wiry, and the horse becomes very restless, pawing his litter and looking back at his sides in a wistful and anxious

manner. In the next stage all these signs are aggravated; the hind legs are used to strike at but not touch the belly; and the horse lies down, rolls on his back and struggles violently. The pulse becomes quicker and harder, but is still small. The belly is acutely tender and hard to the touch, the bowels are costive, and the horse is constantly turning round, moaning, and regarding his flanks with the most anxious expression of countenance. Next comes on the stage so graphically described by Mr. Percival in the passage previously quoted, the whole duration of the attack being from twelve to forty-eight hours in acute cases, and extending to three or four days in those which are denominated sub-acute.

In the treatment of this disease, as in all those implicating serous membranes, blood must be taken largely, and in a full stream, the quantity usually required to make a suitable impression being from six to nine quarts. The belly should be fomented with very hot water, by two men holding against it a doubled blanket, dipped in that fluid, which should be constantly changed, to keep up the temperature. The bowels should be back-raked, and the following drench should be given every six hours till it operates, which should be hastened by injections of warm water.

Take of Linseed oil,	1 pint.
Laudanum,	2 ounces.

If the first bleeding does not give relief in six or eight hours it must be repeated to the extent of three or four quarts, and at the same time some liquid blister may be rubbed into the skin of the abdomen, continuing the fomentations, at short intervals, under that part, which will hasten its operation. The diet should be confined to thin gruel or bran mash, and no hay should be allowed until the severity of the attack has abated.

ABOUT BLEEDING.

In this connection we wish to impress the advice previously given, that bleeding should not be resorted to unless it be that a competent veterinary surgeon cannot be had. It is desperate treatment and too often employed without necessity. The object of bleeding is to suddenly deplete the system, and reduce blood pressure; reactionary effects follow, and if recovery ensues it is by again building up the system by natural means.

To distinguish inflammation from colic is of the highest importance, and for this purpose it will be

necessary to describe the symptoms of the latter disease, so as to compare the two together.

COLIC.

In this disease there is spasm of the muscular coat of the intestines, generally confined to the cecum and colon. Various names have been given to its different forms, such as the *fret*, the *gripes*, *spasmodic colic*, *flatulent colic*, etc., but they all display the above feature, and are only modifications of it, depending upon the cause which has produced it. In spasmodic colic, the bowels are not unnaturally distended, but in flatulent colic their distension by gas brings on the spasm, the muscular fibers being stretched to so great an extent as to cause them to contract irregularly and with a morbid action. Sometimes, when the bowels are very costive, irritation is established as an effort of nature to procure the dislodgment of the impacted fecal matters, and thus a third cause of the disease is discovered. The exact nature and cause are always to be ascertained from the history of the case and its symptoms, and as the treatment will especially be conducted with a view to a removal of the cause, they are of the highest importance. The symptoms in all cases of colic, by which it may be distinguished from the last described disease, are as follows: In both acute pain is manifested by stamping, looking at the flanks, and rolling; but in enteritis the pain is constant, while in colic there are intervals of rest, when the horse seems quite easy, and often begins to feed. In both the poor animal strikes at his belly; but in the former he takes great care not to touch the skin, while in the latter (colic) he will often bring the blood by his desperate efforts to get rid of his annoyance. In enteritis the belly is hot and exquisitely tender to the touch, but in colic it is not unnaturally warm, and gradual pressure with a broad surface, such as the whole hand, always is readily borne, and generally affords relief. The pulse also is little affected in colic; and lastly, the attack is very much more sudden than in peritoneal inflammation.

Such are the general signs by which a case of colic may be distinguished from inflammation of the bowels, but beyond this it is necessary to investigate whether it is pure spasmodic colic, or produced by flatulence, or by an obstruction in the bowels.

In spasmodic colic all the above symptoms are displayed, without any great distension of the abdomen; and if the history of the case is gone into, it

will be found that after coming in heated the horse has been allowed to drink cold water, or has been exposed in an exhausted state to a draught of air.

In flatulent colic the abdomen is enormously distended; the attack is not so sudden, and the pain is not so intense, being rather to be considered, in the average of cases, as a high degree of uneasiness, occasionally amounting to a sharp pang, than giving the idea of agony. In aggravated attacks the distension is so enormous as to leave no doubt of the nature of the existing cause. Here also the spasms are often brought on by drinking cold water while the horse is in a heated and exhausted state.

Where there is a stoppage in the bowels to cause the spasm, on questioning the groom, it will be found that the dung for some days has been hard and in small lumps, with occasional patches of mucus upon it. In other respects there is little to distinguish this variety from the last.

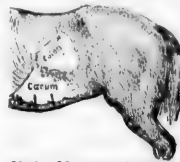
The treatment must in all cases be conducted on a totally different plan to that necessary when inflammation is present. Bleeding will be of no avail, at all events in the early stages, and before the disease has gone on, as it sometimes will, into an inflammatory condition. On the other hand, stimulating drugs, which would be fatal in enteritis, will here generally succeed in causing a return of healthy muscular action. The disease is indeed similar in its essential features to cramp in the muscles of the human leg or arm, the only difference being that it does not as speedily disappear, because it is impossible to get at the muscular coat of the intestines, and apply the stimulus of friction.

As soon as a case is clearly made out to be of a spasmodic nature, one or other of the following drenches should be given, the choice being made in proportion to the intensity of the symptoms:

- | | |
|--|------------|
| 1. Sulphuric ether, | 1 ounce. |
| Laudanum, | 2 ounces. |
| Compound decoction of aloes, | 5 ounces. |
| Mix and give every half hour until relief is afforded. | |
| 2. Spirit of turpentine, | 4 ounces. |
| Linseed oil, | 12 ounces. |
| Laudanum, | 1½ ounce. |
| Mix and give every hour until the pain ceases. | |
| 3. Aromatic spirit of ammonia, | 1½ ounce. |
| Laudanum, | 2 ounces. |
| Tincture of ginger, | 1½ ounce. |
| Hot ale, | 1 quart. |
| Mix and give every hour. | |

Hot water should also be applied to the abdomen, as described under the head of enteritis, and if an enema pump is at hand large quantities of water, at a temperature of 100° Fahrenheit, should be injected *per anum*, until in fact the bowel will hold no more without a dangerous amount of force.

In flatulent colic the same remedies may be employed, but the turpentine mixture is here especially beneficial. The use of warm water injections will often bring away large volumes of wind, which at once affords relief, and the attack is cured. Sometimes, however, the distension goes on increasing, and the only chance of recovery consists in a puncture of the cecum, as it



Mark of Puncture in Flatulent Colic.

lies high in the right flank, where, according to French veterinary writers, it may often be opened when greatly distended, without dividing the serous covering. The operation, however, should only be performed by an experienced hand, as it is one of great danger, and a knowledge of the anatomy of the parts concerned is required to select the most available situation. The point of puncture is indicated in the cut at the top of the patch (colon). If necessary to again puncture, it should not be at the former opening.

The treatment of inflammation must be completely *a posteriori* (by injections), for all anterior proceedings with aperient medicines will only aggravate the spasms. Injection of gallons of warm water, or of gruel containing a quart of castor oil and half a pint of spirit of turpentine, will sometimes succeed in producing a passage, and at the same time the spasm may be relieved by the exhibition at the mouth of one ounce of laudanum and the same quantity of sulphuric ether. If there is any tenderness of the abdomen, or the pulse has a tendency to quicken, it will be better to resort to bleeding, which alone will sometimes cause the peristaltic action to be restored in a healthy manner. The case, however, requires great patience and judgment, and as no great good can be effected, it is highly necessary to avoid doing harm, which can hardly be avoided if the remedies employed are not at once successful. [Except in the most extreme cases bleeding should not be

resorted to except by advice of a competent veterinarian. ED.

When the urgent symptoms of colic in any of its forms are relieved, great care must be exercised that a relapse does not take place from the use of improper food. The water should have the chill taken off, and a warm bran mash given, containing in it half a feed of bruised oats. Nothing but these at moderate intervals, in the shape of food or drink, should be allowed for a day or two, and then the horse may gradually return to his customary treatment, avoiding, of course, everything which may appear to have contributed to the development of colic.

To still further exhibit the importance of distinguishing the symptoms as between inflammation of the bowels and colic we give the following tabulation from a competent English authority:

SYMPTOMS OF COLIC.

Sudden in its attack.

Pulse rarely much quickened in the early part of the disease, but evidently fuller.

Legs and ears of the natural temperature.

Relief obtained from rubbing the belly.

Relief obtained from motion.

Intervals of rest.

Strength scarcely affected.

SYMPTOMS OF INFLAMMATION OF THE BOWELS.

Gradual in its approach, with previous indications of fever.

Pulse very much quickened, but small, and often scarcely to be felt.

Legs and ears cold.

Belly exceedingly tender, and painful to the touch.

Motion evidently increases pain.

Constant pain.

Rapid and great weakness.

SCRATCHES, WEED, GREASE.

These are names given to denote inflammation of the absorbent vessels, known among veterinarians as lymphangitis. When the inflammation of the lymphatics, extending to the cellular tissue, becomes chronic, it produces permanent effusion and swelling of the limb; sometimes the swelling extends from the hoof to the body, and in some cases the constitution is seriously impaired. The nostrils are dilated, sweat rolls from the body, abscesses form, break internally and run along the skin. In less

advanced stages the swollen limb is favored and held from the ground, and the inner surface is found swollen. There is heat, and tenderness to the touch, and often the glands will be greatly raised, swollen and lumpy. Simple scratches or cracked heels may lead on to this. Hence the time to combat the disease is in the early stages of the malady.

For cracked heels, if bad, the animal must rest, at all events till the parts are improved. When slight, always wash them with tepid water and mild soap, upon the animal's return to the stable; dry them thoroughly with soft cloth; then dampen them with the following:

Animal glycerine,	Half a pint.
Chloride of zinc,	2 drachms.
Strong solution of oak bark,	1 pint.

Dissolve the zinc in water, mix, and use three times a day.

Should sloughing and ulceration have commenced, forbear all exercise; allow rest in the stable; give a few bran mashes, a little cut grass or similar food to open the bowels; but do not take the horse out, even for exercise. Ulceration is too irritable and painful and necessitates inaction for its relief. Apply the following to the heels:

Animal glycerine,	2 oz.
Permanganate of potash,	$\frac{1}{2}$ oz.
Water,	3 oz.

Mix, and apply six times daily.

Or the following:

Phosphoric acid,	2 oz.
Croosote,	$\frac{1}{2}$ oz.
Water,	3 oz.

Mix, and apply six or seven times a day.

Upon the ulceration being arrested, the last prescriptions may be discarded, and the first recipe resorted to; with these, however, it is always well to attend to the constitution. A drink, each day, composed of liquor arsenicalis, half an ounce; tincture of the muriate of iron, one ounce; water half a pint, should be given every night. This is upon the authority of Mayhew, and is among the best. Even upon the slightest attack of grease or scratches, the constitutional habit of the horse must be attended to. The form should be of such a nature as to keep the bowels somewhat loose. Bran mashes, roots, boiled



Bad State of Grapes, showing Grapes or Hairy Branches.

food, and fresh, green grass will be indicated. It may be necessary even to give a moderate purgative. If so, four drachms of powdered aloes and one drachm of calomel may be used, to be mixed with molasses and linseed meal to form a ball, and given as one dose. If there is a decided chill of the body, the following will be a good stimulant: Give one and up to two ounces of tincture of arnica, as the case may seem to demand, in a pint of tepid water.

DECIDED GREASE.

In the more serious stages, it may be necessary to give a tonic and alterative like the following:

Liquor arsenicalis,	1 oz.
Tincture of muriate of iron,	1½ oz.
Porter or ale,	1 quart.

Mix, and give one-half at night, and the other half next morning.

In the earlier stages of grease, wash thoroughly with castile soap and warm water; dry gently but thoroughly with soft cloths, and with a soft paint brush rub gently into the inflamed parts to fully dampen, but not wet them, of the following:

Chloride of zinc,	30 grains.
Water,	1 pint.

At the end of a quarter of an hour, apply a little glycerine over the whole to keep the parts supple; once a day will be sufficient to cleanse, to apply the lotion and the glycerine, unless there is considerable discharge. If the ulceration continues, increase the solution of zinc up to forty, fifty or sixty grains to the pint of water. If the fungoid growth is extensive, and will not yield to this treatment, a veterinarian had better be consulted. In any case it must be remembered that constitutional remedies must be used, as indicated, to bring the system into condition before the eruption can be cured.

SECTION III.—INJURIES AND WOUNDS.

Injuries are the most common form of disability to which horses are subject on the farm. The most usual of these are strains, bruises, contusions and wounds from sharp instruments. Strains and sprains arise from over distention of the muscles and ligaments, causing great pain, often inflammation and sometimes permanent lameness.

Wounds are divided into incised, contused, lacerated, punctured, and penetrating wounds. The late Dr. Dadd has given so accurate an account of the several varieties of wounds and their common sense

treatment that we reproduce the matter according to that authority.

INCISED WOUNDS.

Incised wounds are those inflicted by sharp instruments. On the human body they often heal without any subsequent inflammation, beyond what nature sets up in the restorative process; but the difficulty in the horse is, that we can not always keep the parts in contact, and therefore it is not so easy to unite them. In many cases, after having been at the trouble to adjust by sutures the edges of divided parts, and when all seems going on favorably, the animal gets his head round, and tears the wound open afresh, so that our labor is all in vain. This puts a damper on healing by first intention. There are several other difficulties in the way of healing by this method, well known to anatomists. We shall just merely refer to the principal one, because it may satisfy the reader that some wounds had better not be sutured, for they put the subject to a great deal of pain for no purpose.

Horses, as well as some other animals, have a peculiar muscular arrangement under the skin, by means of which they can shake off flies and other foreign bodies; and it is owing to the facility with which they can jerk or move the skin that we often fail in uniting flesh wounds. Other obstacles are to be met with, both in relation to the size of the wound and as regards its anatomical direction. If the wound is seen immediately after infliction, and there seems to be the least probability of healing by first intention, examine the part. If there be found

neither dirt nor foreign body of any kind, the blood had better not be washed off; for this is the best healing material in the world. The edges are then to be brought together by interrupted sutures, taking care not to include the hair between the edges of the wound, for that would effectually prevent union. Nothing more is needed but to secure the animal so that he can not get at it. If he is to be kept in the stable, without exercise, for any length of time, he had better be put on half diet. Pure air will not hurt him.

Interrupted Sutures. *a*, fastened with white thread or silk; *b*, fastened with silvered wire.

CONTUSED WOUNDS.

Contused wounds are generally occasioned by

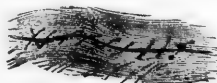
hooks, or some blunt body connected with the harness or vehicle. They generally leave a gaping wound with bruised edges. We have only to remember that nature possesses the power of repairing injuries of this kind—of filling up the parts and covering them with new skin; all we have to do is, to attend to the general health of the animal, and keep the wound in a healthy condition. A usual application and a good one, is the compound tincture of myrrh. If the parts assume an unhealthy aspect, a charcoal poultice will rectify that. If such can not be applied, owing to the situation of the wound, dress it with pyroligneous acid.

LACERATED WOUNDS.

Lacerated wounds are generally in the form of a rent rather than cut, inflicted by the calking of a shoe tearing off the integuments and subcellular tissue, leaving a sort of triangular flap. In these cures we generally employ sutures, and treat them the same as incised wounds.

PUNCTURED WOUNDS.

Punctured wounds are those inflicted by a pointed body, as a nail in the foot, point of a fork, or splinter



Uninterrupted Suture.



Suture Needle.

of wood. These are the most dangerous kinds of wounds, for they are frequently the cause of fistula and locked-jaw. In the treatment of punctured wounds, first examine by probe or otherwise, and remove any foreign body that may be present, and then poultice with flax seed, into which stir a small quantity of fir balsam.

PUNCTURE OF THE FOOT.

In puncture of the foot by nail, instead of plastering it with tar, and forcing a tent into the orifice, and then covering the sole with leather, as many persons are wont to do, have the shoe taken off, the foot washed clean, and a moderately warm poultice applied, and renew daily, until the suppurative stage commences. That once established, we may consider the animal safe; for many men, as well as animals, have lost their lives from the absorption of pus formed in the wound after the external breach had healed.

INJURY TO THE BONE.

When a bone is injured by the point of a nail, or fork, the cure is rather tedious; the primary means, however, are the same. The poultices may be followed by astringent injections, as alum water, etc. In case of injury to the bone, we use pyroligneous acid, to be thrown into the wound by means of a small syringe. If extensive disease of the bone sets in, the services of a veterinary surgeon will be required. A very profuse or unhealthy discharge from a punctured wound must be met by constitutional remedies. Sulphur and sassafras, to the amount of half an ounce each, every other day, to the amount of three or four doses, will arrest the morbid phenomenon. The local remedy in all cases of this kind is diluted acetic or pyroligneous acid.

PENETRATING WOUNDS.

Penetrating wounds are inflicted by the horns of cattle, stakes, shafts, etc., and have to be treated according to the nature of the case. A penetrating wound of the walls of the abdomen is generally followed by protrusion of the intestines; this has to be returned; the wound is then closed by strong sutures, and the belly must be encircled with a long bandage. In such cases, keep the bowels soluble with scalded shorts, well seasoned with salt, and empty the rectum occasionally by means of injections. A quart of soap-suds or simply water, either to be of the temperature of 96 to 100 degrees of heat.

SPRAINS.

In the treatment of sprains rest and quiet is necessary. Reduce the early inflammation by hot or cold water fomentations or cooling lotions, as the case may seem to require. If hot water fomentation is employed it must be continuous until the inflammation subsides. Cold water is intended to reduce the inflammation by coolness and evaporation. Cooling lotions have the same tendency. After this there must be firm and steady pressure by bandages to prevent infiltration of the parts, and if stiffness is likely to ensue then counter irritants and gentle exercise must be given.

To return now to remedies in lieu of the hot and cold water applications:

Tincture of arnica, in the proportion of one-half an ounce to a pint of water, has a great reputation. It has been, however, questioned whether its chief

value does not lie in the alcohol contained. One of the best lotions is:

Spirits of camphor,	1 ounce.
Vinegar,	4 ounces.
Soft water,	1 pint.

The inflammation being reduced, if stiffness and swelling continue, apply the following:

Mercurial ointment,	2 ounces.
Camphor,	1 drachm.
Oil of tar,	4 ounces.
Linseed oil,	4 ounces.

Mix as a liniment.

SHOULDER LAMENESS.

For shoulder lameness, when shrinking of the muscles is indicated, prepare the following:

Oil of turpentine,	1 ounce.
Spirits of camphor,	2 ounces.

CALLOUS ENLARGEMENTS.

For callous enlargements, the results of bruises, and for chronic enlargements of the glands, a good preparation will be:

Iodine,	1 ounce.
Soap liniment,	12 ounces.

GENERAL TREATMENT OF WOUNDS.

Punctured and lacerated wounds bleed less than those from a clean cut. The reason is, the shock usually takes up the arteries.

TO CHECK BLEEDING.

If the blood is in spurts and of a bright red color it is arterial blood. The arteries must be found and drawn out with the forceps sufficiently, so they may be tied with a thread. If the flow is steady and dark, holding ice to the part or sponging with cold water will check it. If the wound is filled with dirt, gravel, etc., it may be cleansed with cold water.

TO SPONGE AND DRESS A WOUND.

Do not dab a sponge into the wound. Pour water on it and pick out hair, dirt or gravel. Then bring the parts together as heretofore directed and sew, or confine with strips of plaster, as the case may indicate, being careful to leave orifice enough for the escape of matter (pus). That is, the stitches must not be close together.

If the wound be an old one, foul, and perhaps maggoty, cut away all ragged and dead parts, sprinkle with calomel to kill the maggots, and wash the wound by pouring upon it warm water from a height. Then swab the whole with the following lotion:

Carbolic acid,	2 drachms.
Soft water,	1 pint.

Also lay in and around the wound lint or rags wet with the same. Bandage loosely and wet several times a day with the lotion until the parts show signs of healing. Then remove and treat with compound tincture of myrrh as directed for healthy wounds. The foregoing will apply to injuries to all farm animals.

CHAPTER XVIII.

VARIOUS DISEASES AND TREATMENT.

SECTION I.—SYMPTOMS AND HOW TO KNOW THEM.

It is not necessary in presenting symptoms of diseases that are to be treated by unprofessional practitioners, to do more than give the general symptoms—those easily distinguished,—since accurate knowledge is required to follow minute changes in a disease, as indicated by changed symptoms. In animals incapable of expressing themselves intelligently it is only in a general way that obscure symptoms are known. Pulse, position, expression of countenance, breathing, auscultation, percussion; all these are a part of the regular examination, as among those that may be understood generally by direction. It is practice, however, that perfects the senses in detecting these. There are others that must be learned by personal examination, under the direction of an expert. Hence in the alphabetical list of diseases and remedies which we give, and in which we follow Mayhew's English work generally, we briefly summarize the principal symptoms, and several remedies and appropriate doses to be selected from. Diseases that are incurable will be so stated; also those that should be treated by a professional veterinarian will be indicated. Incurable diseases are rare on the farm. Diseases that can only be treated by the professional surgeon are not common. The long list of diseases found in large and crowded stables are mostly confined to large cities, where veterinary advice may be procured. We advise such assistance to be sought when possible, and repeat that in those neighborhoods where veterinary advice cannot be had, the family physician should not disdain to give advice in serious cases. It should be needless to remark that the advice ought to be as cheerfully paid for as though the patient was of the human race. Those properly requiring the attendance of the veterinary surgeon will be marked with a *. Those incurable will be so stated. It is often merciful to destroy. In all contagious diseases bury deeply, first covering the animal with quick-

lime. When specific names are used the reader is referred to the glossary for explanation.

ABCESS OF THE BRAIN.

Symptoms.—Dullness; refusal to feed; a slight oozing from a trivial injury upon the skull; prostration, and the animal, while on the ground, continues knocking the head violently against the earth until death ensues.

Death is sure to follow.

* ABDOMINAL INJURIES.

Ruptured diaphragm generally produces a soft cough; sitting on the haunches or leaning on the chest may or may not be present; the countenance is haggard.

Ruptured stomach is characterized by excessive colic, followed by tympanitis.

Introsusception possibly may be relieved by the inhalation of a full dose of chloroform; but the result is always uncertain.

Invagination is attended with the greatest possible agony.

Strangulation is not to be distinguished, during life, from invagination.

Calculus causes death by impactment; but however different the causes of abdominal injury may be, they each produce the greatest agony, which conceals the other symptoms, and makes all such injuries apparently the same while the life lasts. All these are, as a rule, deadly, and should be treated by a surgeon.

* ACITES, OR DROPSY OF THE ABDOMEN.

Symptoms.—Pulse hard; head pendulous; food often spoiled; membranes pallid; mouth dry. Pressure to abdomen elicits a groan; turning in the stall calls forth a grunt. Want of spirit; constant lying down; restlessness; thirst; loss of appetite; weakness; thinness; enlarged abdomen; constipation and hide-bound. Small bags depend from the chest and belly; the sheath and one leg sometimes enlarge; the mane breaks off; the tail drops out. Purgation and death.

Treatment.—When the symptoms first appear give, night and morning, strychnia, half a grain, worked up to one grain; idiode of iron, half a drachm, worked up to one drachm and a half; extract of belladonna, one scruple; extract of gentian and powdered guassia, of each a sufficiency; apply small blisters, in rapid succession, upon the

abdomen; but if the effusion is confirmed a cure is hopeless.

ACUTE DYSENTERY.

Symptoms.—Abdominal pain; violent purgation; the feces become discolored, and water fetid; intermittent pulse; haggard countenance; the position characterizes the seat of anguish. Perspiration, tympanitis and death.

Treatment.—Give sulphuric ether, one ounce; laudanum, three ounces; liquor potasse, half an ounce, tincture of catechu, one ounce; cold linseed tea, one pint. Repeat every fifteen minutes. Cleanse the quarters; plait and tie up the tail; inject cold linseed tea. The whole of the irritating substance must be expelled before improvement can take place.

* ACUTE GASTRITIS, GENERALLY FROM POISONING.

Symptoms.—Excessive pain, resembling fury.

Treatment.—Give, as often and as quickly as possible, the following drink: Sulphuric ether 20; laudanum, of each three ounces; carbonate of magnesia, soda, or potash, four ounces; gruel, quite cold, one quart. Should the pulse be sinking, add to the drink carbonate of ammonia, one drachm. If corrosive sublimate is known to be the poison, one dozen raw eggs should be blended with each drench. If delirium be present, give the medicine as directed for tetanus, with the stomach pump.

* ACUTE LAMINITIS.

Symptoms.—Flesh quivering; eyes glaring; nostrils distended; and breath jerking; flanks tucked up; back roached; head erect; mouth closed; hind legs advanced under the belly; fore legs pushed forward; fore feet resting upon the heels, with constant movement.

Treatment.—Put on the slings. Soak the feet in warm water, in which a portion of alkali is dissolved. Cut out the nails from the softened horn. Before the shoes are removed give half a drachm of belladonna and fifteen grains of digitalis, and repeat the dose every half hour until the symptoms abate. Clothe the body; place thin gruel and grass within reach; leave men to watch.

Next morning give sulphuric ether and laudanum, of each two ounces, in a pint of water. Should the pastern arteries throb, open the veins and place the feet in warm water. While the affection lasts, pursue these measures; it is a bad symptom, though not a certain one, if no change for the better takes place in five days.

* ALBUMINOUS URINE.

Symptoms.—The legs are either stretched out or the hind feet are brought under the body. Straddling gait, and much difficulty in turning within the stall. Some urine being caught, it is thick, and answers to certain chemical tests.

Treatment.—Give a laxative, and apply mustard to the loins. As after-measures, perfect rest, attention to diet, and repeated doses of opium.

APHTHA.

Symptoms.—Small swellings on the lips; larger swellings upon the tongue. As the disease progresses, a clear liquid appears in each swelling. The bladders burst, crusts form, and the disease disappears.



Aphtha.

Treatment.—Soft food; wash for the mouth: borax, five ounces; honey or treacle, two pints; water, one gallon. Mix. In severe cases take professional advice.

BOG SPAVIN.

A puffy swelling at the front of and at the upper part of the hock. This disease is quite distinct from true or bone spavin, and not generally serious.

Treatment.—Pressure, maintained by means of an India-rubber bandage.

BROKEN WIND.

Symptoms.—Short, dry, hacking cough; ravenous appetite; insatiable thirst; flatulence; food half digested; belly pendulous; coat ragged; aspect dejected. Respiration is performed by a triple effort; inspiration is spasmodic and single; expiration is labored and double. The ribs first essay to expel the air from the lungs; these failing, the diaphragm and abdominal muscles take up the action.

Treatment.—No permanent cure. Relief is possible. Never give water before work. Four half pails of water to be allowed in twenty-four hours. In each draught mingle half an ounce of phosphoric acid or half a drachm of sulphuric acid. Remove the bed in the day; muzzle at night; put a lump of rock salt and of chalk in the manger. Never drive hard or take upon a very long journey.

BROKEN KNEES.

Symptoms.—The horse falls; the knee may only be slightly broken, but deeply contused. A slough must then take place, and open joint may result. Or the animal may fall, and when down be driven forward

by the impetus of its motion. The knee is cut by the fall, and the skin of the knee may be forced back by the onward impulse. This skin will become dirty; but the removed integument will fly back on the animal's rising, thus forming a kind of bag containing and concealing foreign matter.

Treatment.—Procure a pail of milk-warm water and a large sponge. Dip the sponge in the pail and squeeze out the water above the knee. Continue to do this, but do not dab or sop the wound itself. The water flowing over the knee will wash away every impurity. Then with a probe gently explore the bag. If small, make a puncture through the bottom of the bag; if large, insert a seton, and move it night and



How to wash a Broken Knee.

morning until good pus is secreted; then withdraw the seton. Tie up the horse's head; get cold water, to every quart add two ounces of tincture of arnica. Dip a sponge into the liquid. Squeeze the sponge dry above the joint. Do this every half hour for three and a half days, both by day and night. If at the end of that time all is going on well, the head may be released; but should the knee enlarge and become sensitive, while the animal refuses to put the foot to the ground, withdraw the seton; give no hay, but all the oats that will be eaten. If the horse suffers from standing, place in slings; apply arnica lotion until a slough takes place; then resort to the chloride of zinc lotion, one scruple to the pint of water, and continue to use this.

BRONCHOCELE.

Symptom.—An enlargement on the side of the throat.

Treatment.—Give the following, night and morning: Iodide of potassium, half a drachm; liquor potassæ, one drachm; distilled water, half a pint. Also, rub into the swelling, iodide of lead, one drachm; simple cerate, one ounce. Grind together as an ointment.

BRUISE OF THE SOLE.

Symptom.—Effusion of blood into the horny sole.

Treatment.—Cut away the stained horn, and shoe with leather.

* CANKER.

Symptoms.—Not much lameness. The disease commences at the cleft of the frog; a liquid issues from the part, more abundant and disagreeable than in thrush; it often exudes from the commissures joining the sole to the frog. The horn first bulges out, then flakes off, exposing a spongy and soft substance (fungoid horn.) This is most abundant about the margin of the sole, and upon its surface it flakes off. The disease is difficult to eradicate when one fore foot is involved. When all four feet are implicated, a cure is all but hopeless, and the treatment is certain to be slow and vexatious.

Treatment.—See that the stable is clean and comfortable, and that the food is of the best; allow liberal support; pare off the superficial fungoid horn, and so much of the deep seated as can be detached. Apply to the diseased parts of the following: Chloride of zinc, half an ounce; flour, four ounces. Put it on the foot without water. To the sound hoof apply chloride of zinc, four grains; flour, one ounce. Cover the sound parts before the cankered horn is dressed; tack on the shoe; pad well and firmly. When places appear to be in confirmed health, the following may be used: Chloride of zinc, two grains; flour, one ounce. At first, dress every second day; after a time, every third day, and give exercise as soon as possible.

* CAPPED ELBOW.

Injury to the point of the elbow. See capped hock.

* CAPPED HOCK.

Symptoms.—A round swelling on the point of the hock, which, should the cause be repeated, often becomes of great size.

Treatment.—If small, hand-rub the tumor constantly for a few days. Should the capped hock be of magnitude, dissect out the enlargement, without puncturing it. Remove none of the pendulous skin. Treat the wound with the lotion of chloride of zinc—one grain to the ounce of water—and it will heal after some weeks.

* CAPPED KNEE. *

Symptom.—A soft tumor in front of the knee.

Treatment.—Draw the skin to one side, and with a lancet pierce the lower surface of the tumor. Treat the wound as an open joint.

* CATARACT.

Symptoms.—When partial, shying; if total, white pupil and blindness.

Treatment.—Color the inside of the stable green, as cataract, when not total, is sometimes absorbed.

* CHOKING.

Causes.—Something impacted in the gullet, either high up or low down.

Symptoms.—High choke—raised head; saliva; discharge from the nostrils; inflamed eyes; haggard countenance; audible breathing; the muscles of neck tetanic; the flanks heave; the fore feet paw and stamp; the hind legs crouch and dance; perspiration; agony excessive. Low choke—the animal ceases to feed; water returns by the nostrils; countenance expresses anguish; saliva and nasal discharge; labored but seldom noisy breathing; roached back; tacked up flanks, while the horse stands as though it were desirous of elevating the quarters.

Treatment.—Make haste when high choke is present. Perform tracheotomy, if necessary to relieve the breathing; insert the balling-iron, or, with a hook extemporized out of any wire, endeavor to remove the substance from the throat. If the choking body is too firmly lodged to be thus removed, sulphuric ether must be inhaled to relax the spasm. Low choke is seldom fatal before the expiration of three days. Give a quarter of a pint of oil every hour; in the intermediate half hours give sulphuric ether, two ounces; laudanum, two ounces; water, half a pint; and use the probang after every dose of the last medicine. Should these be returned, cause chloroform to be inhaled; then insert the probang, and, by steady pressure, drive the substance forward.

After the removal of impactment feed with caution.

CHRONIC DYSENTERY.

Symptoms.—Purging without excitement, always upon drinking cold water; violent straining; belly enlarges; flesh wastes; bones protrude; skin hide-bound; membranes pallid; weakness; perspiration; standing in one place for hours. At last the eyes assume a sleepy expression; the head is slowly turned toward the flanks; remains fixed for some minutes; the horse only moves when the bowels are about to act; colic; death.

Treatment.—Give, thrice daily, crude opium, half an ounce; liquor potassæ, one ounce; chalk, one ounce; tincture of allspice, one ounce; alum, half an ounce; ale, one quart. Feed lightly; dress frequently; give a good bed and a roomy box stall.

* CHRONIC GASTRITIS.

Symptoms.—Irregularity of bowels and appetite; pallid membranes; mouth cold; a dry cough; tainted breath; sunken eye; catching respiration; pendulous belly; ragged coat, and emaciation. Sweating on the slightest exertion; eating wood-work or bricks and mortar.

Treatment.—Give powdered nux vomica, one scruple; carbonate of potash, one drachm; extract of belladonna, half a drachm; extract of gentian and powdered quassia, of each a sufficiency. Or, give strychnia, half a grain; bicarbonate of ammonia, one drachm; extract of belladonna, half a drachm; sulphate of zinc, half a drachm; extract of gentian and powdered quassia, of each a sufficiency. Give one ball night and morning. When these balls seem to have lost their power, give half an ounce each of liquor arsenicalis and tincture of ipecacuanha, with one ounce of muriated tincture of iron and laudanum, in a pint of water; damp the food; sprinkle magnesia on it. As the strength improves, give sulphuric ether, one ounce; water one pint, daily. Ultimately change that for a quart of ale or stout daily.

CONGESTION IN THE STABLE.

Symptoms.—Hanging head; food not glanced at; blowing; artery gorged and round; pulse feeble; cold and partial perspirations; feet cold; eye fixed; hearing lost; and the attitude motionless.

Treatment.—Give immediately two ounces each of sulphuric ether and of laudanum in a pint of cold water. Give the drink with every caution. In ten minutes repeat the medicine, if necessary. Wait twenty minutes, and give another drink, if requisite. Take away all solid food, and allow gruel for the remainder of the day.

CRACKED HEELS.

Symptoms.—Thickened skin; cracks; and sometimes ulceration.

Treatment.—Wash; dry thoroughly; apply the following: Animal glycerine, half a pint; chloride of zinc, two drachms; strong solution of oak bark, one pint. Mix. If ulceration has commenced, rest the horse. Give a few bran mashes or a little cut grass to open the bowels. Use the next wash: Animal glycerine, or phosphoric acid, two ounces; permanganate of potash, or creosote, half an ounce; water, three ounces; apply six times daily. Give a drink each day composed of liquor arsenicalis, half an ounce; tincture of muriate of iron, one ounce; water, one pint.

CURB.

Causes.—Wrenching the limb; by strains, by leaping, etc.

Symptom.—A bulging out at the posterior of the hock, accompanied by heat and pain, often by lameness.

Treatment.—Rest the animal. Put on an India-rubber bandage, and under it a folded cloth. Keep the cloth wet and cool with cold water. When all inflammation has disappeared, blister the hock.

* CYSTITIS, OR INFLAMMATION OF THE BLADDER.

Symptoms.—Those common to pain and inflammation. Urine, however, affords the principal indication. At first, it is at intervals jerked forth in small quantities. Ultimately it flows forth constantly drop by drop. Press the flank, which, should cystitis be present, calls forth resistance.

Treatment.—Give scruple doses aconite, should the pulse be excited; the same of belladonna, should pain be excessive; and calomel with opium, to arrest the disease. Place under the belly, by means of a rug, a cloth soaked with strong liquor ammonia diluted with six times its bulk of water. Or apply a blanket dipped into hot water; change when it becomes warm.

* DIABETES INSIPIDUS, OR PROFUSE STALING.

Symptoms.—Weakness; loss of flesh; loss of condition.

Treatment.—Do not take from the stable; keep a pail of linseed tea in the manger; give no grass or hay; groom well. Order a ball composed of iodide of iron, one drachm; honey and linseed meal, a sufficiency. Or a drink consisting of phosphoric acid, one ounce; water, one pint. Give the ball daily; the drink, at night and at morning.

* ENTERITIS.

Symptoms.—Dullness; heaviness; picks the food; shivers repeatedly; rolling; plunging; kicking, but more gently than in spasmodic colic; quickened breathing; hot, dry mouth; wiry pulse. Pressure to the abdomen gives pain. If the intestines are very hot, all is confirmed.

Treatment.—Give aconite in powder, half a drachm; sulphuric ether, three ounces; laudanum, three ounces; extract of belladonna, one drachm (rubbed down in cold water; one pint and a half.) As the pulse changes, withdraw the aconite; as the pain subsides, discontinue the belladonna. The other ingredients may be diminished as the horse appears to

be more comfortable. Should the pain linger after the administration of the eighth drink, apply an ammoniacal blister. Sprinkle on the tongue, if any symptoms declare the disease still lingering, every second hour, calomel, half a drachm; opium, one drachm. Feed very carefully upon recovery, avoiding anything purgative or harsh to the bowels.

EXCORIATED ANGLES OF THE MOUTH.

Treatment.—Apply the following lotion: Chloride of zinc, two scruples; essence of anise seed, two drachms; water, two pints.

FALSE QUARTER.

Symptoms.—No lameness, but weakness of the foot. The soft horn of the laminae, being exposed, is apt to crack. Bleeding ensues. Sometimes granulations sprout when the pain and lameness are most acute.

Treatment.—In cases of crack and granulations, treat as is advised for sandcrack. Put on a bar shoe, with a clip on each side of the false quarter. Pare down the edges of the crack, and ease off the point of bearing on the false quarter. A piece of gutta-percha, fastened over the false quarter, has done good.

* FARCY AND FARCY BUDS.

Symptoms.—It is at first inflammation of the superficial absorbents. Lumps appear on various parts. If these lumps are opened, healthy matter is released; but the place soon becomes a foul ulcer, from which bunches of fungoid granulations sprout. From the lumps may be traced little cords leading to other swellings. The appetite fails, or else it is voracious. Matter may be squeezed through the skin. Thirst is torturing. At length glanders breaks forth, and the animal dies. There is a smaller kind of farcy called button-farcy; the smaller sort is the more virulent of the two.

There is no known cure for the disease. Kill and disinfect as soon as the animal develops the disease.

* FISTULOUS WITHERS.

Symptoms.—When first seen, a small, round swelling appears on the off side. If this is neglected, the place enlarges, and numerous holes burst out, which are the mouths of so many fistulous pipes.

Treatment.—In the early stage, lance the tumor and divide it. Touch the interior with lunar caustic; keep the wound moist with the chloride of zinc lotion, one grain to the ounce of water, and cover it with a cloth dipped in a solution of tar. If the sinuses are established, make one cut to embrace as many as possible. Clean out the corruption.

Scrape or cut off any black or white bone which may be exposed. Cover with a cloth, and keep wet with the solution of chloride of zinc. Should there exist a long sinus leading from the withers to the elbow, insert a seton by means of the guarded seton needle. This seton should be withdrawn so soon as a stream of creamy pus is emitted.

FUNGOID TUMORS IN THE EYE.

Symptoms.—Blindness; a yellow, metallic appearance to be seen in the eye.

Treatment.—Of no avail.

GLANDERS.

Symptoms.—Staring coat; lungs or air-passages always affected; flesh fades; glands swell; spirits low; appetite bad. A lymphatic gland adheres to the inside of the jaw; the membrane inside the nose ulcerates; a slight discharge from one nostril. This becomes thicker, and adheres to the margin of the nostril, exhibiting white threads and bits of mucus; then it changes to a full stream of foul pus; next the nasal membrane grows dull and dropsical; the margins of the nostrils enlarge; the horse breathes with difficulty; the discharge turns discolored and abhorrent; farcy breaks forth, and the animal dies of suffocation.

Treatment.—Kill the animal at once, bury deeply, and disinfect every thing with which the animal has come in contact.

GUTTA SERENA.

Symptoms.—Fixed dilation of the pupil; a greenish hue of the eye; total blindness. Active ears; restless nostrils; head erect; high stepping; occasionally a rough coat in summer and a smooth coat in winter.

Treatment.—No remedy is available.

* HEMATURIA, OR BLOODY URINE.

Symptoms.—Discoloration of the fluid. When the bleeding is copious, breathing is oppressed; the pupils of the eyes are dilated. Pulse is lost; head is pendulous; membranes are pale and cold. Lifting up the head produces staggering. Back roached; flanks tucked up; legs wide apart.

Treatment.—Be gentle. Act upon the report given. Give acetate of lead, two drachms, in cold water, one pint; or, as a ball, if one can be delivered. In a quarter of an hour repeat the dose, adding laudanum, one ounce, or powdered opium, two drachms. Repeat the physic till one ounce of acetate of lead ash been given. Leave the horse undisturbed for two

hours, if the symptoms justify delay. If not, dash pailfuls of cold water upon the loins from a height. Give copious injections of cold water. Pour half a pint of boiling water upon four drachms of ergot of rye. When cold, add laudanum, one ounce, and dilute acetic acid, four ounces. Give two of these drinks, and two cold enemata, at intervals of twenty minutes' duration. Suspend all treatment for eight hours, when the measures may be repeated.

HYDROPHOBIA.

Symptoms.—The horse is constantly licking the bitten place. A morbid change takes place in the appetite. Eager thirst, but inability to drink, or spasm at the sound or sight of water is exhibited. Nervous excitability; voice and expression of countenance altered. More rarely the horse—when taken from the stable—appears well. While at work, it stops and threatens to fall. Shivers violently, and very soon afterward the savage stage commences. The latter development consists in the utmost ferocity, blended with a most mischievous cunning, or a malicious pleasure in destruction.

Treatment.—Confine in a strong place, shoot immediately and bury.

LUXATION OF THE PATELLA.

Symptoms.—The horse stops short, and has one of the hind legs extended backward. A swelling upon the outer side. The pastern is flexed, the head raised, and the animal in great pain.

Treatment.—Get into a shed, and with a rope, one end of which has been fixed to the pastern, have the leg dragged forward while some one pushes the bone into its place. A man should be put to keep the bone in its situation for some hours. Give strengthening food, and do not use for six weeks subsequently.

MALLENDERS AND SALLENDERS.

Symptoms.—Scurf upon the seats of flexion; malleanders occurs at the back of the knee, and sallenders at the front of the hock.

Treatment.—Cleanliness. Rub the parts with this ointment: Animal glycerine, one ounce; mercurial ointment, two drachms; powdered camphor, two drachms; spermaceti, one ounce. If cracks appear, treat as though cracked heels were present.

* LAMINITIS (SUB-ACUTE).

Symptoms.—First noticed by the manner of going upon the heels of the fore feet.

Treatment.—Get into slings. Remove the shoes. If costiveness is present open the bowels with soft or green food, but do not purge. Allow two drinks per day, each consisting of one ounce of sulphuric ether and half a pint of water; half-drachm doses of belladonna, to allay pain; sound oats crushed, for food; no hay. Stimulants, a quart of brown stout, morning and evening may be allowed.

MEGRIMS.

Symptoms.—The horse suddenly stops; shakes the head; strange stubbornness may be exhibited, followed by a desire to run into dangerous places. Then ensues insensibility accompanied by convulsions.

Treatment.—Give a long rest, and avoid excitement. An animal subject to megrims is worthless and dangerous.

* NASAL GLEET.

Symptoms.—Distortion of the face; partial enlargement and softening of the facial bones; irregular discharge of fetid pus from one nostril. The discharge is increased, or brought down by feeding off the ground, or by trotting fast.

Treatment.—Surgical operation, with injection of a weak solution of chloride of zinc. Also give daily a ball composed of balsam of copaiba, half an ounce; powdered cantharides, four grains; cubeba, a sufficiency. If the foregoing should affect the urinary system, change it for half-drachm doses of extract of belladonna, dissolved in a wineglass of water. Give these every fourth day, and on such occasions repeat the belladonna every hour, until the appetite has been destroyed.

* NAVICULAR DISEASE.

Symptoms.—Acute lameness; this disappears, but may come again in six or nine months. Acute lameness is then present for a longer time, while the subsequent soundness is more short. Thus the disease progresses, till the horse is lame for life. The pain in one foot causes greater stress upon the sound leg, and from this cause both feet are ultimately affected. The foot is pointed in the stable. The bulk diminishes, while the hoof thickens and contracts. The horse, when trotting, takes short steps, and upon the toe, going groggily.

Treatment.—Feed liberally upon crushed oats. Soak the foot every other night in hot water. Afterward bandage the leg, fix on tips, and having smeared the horn with glycerine, put on a sponge boot. Rest

very long—six months in the first instance—and then give three months easy work on soft land. In bad cases resort to neurotomy, but do so upon the second attack of lameness; because continued disease disorganizes the internal structures of the hoof, and also causes navicular disease.

PARTIAL PARALYSIS.

Symptom.—One hind leg gets in the way of the other, and threatens to throw the animal down.

Treatment.—A loose box; warm clothing; good grooming; warmth to loins; regulate the bowels with mashes and green grass; absolute rest. Give the following ball night and morning: Strychnia, half a grain, (gradually work this medicine up to one grain and a half); iodide of iron, one grain; quassia powder and treacle, a sufficiency to form the mass.

PHRENETIS.

Symptom.—Heaviness, succeeded by fury in excess, but without any indication of malice.

Treatment.—Bled from both jugulars till the animal drops. Then pin up, and give a strong purgative. Follow this with another blood-letting, if



necessary, and scruple doses of tobacco; half-drachm doses of aconite root; or drachm doses of digitalis—whichsoever is procured must be infused in a pint of water, and, when cool and strained, it ought to be given every half hour till the animal becomes quiet. The probable result, however, is death. And in any case the animal is unsafe.

*PLEURISY.

Symptoms.—These are quickly developed. The pulse strikes the finger; pain continuous; agony never ceases; horse does not feed; body hot; feet cold; partial perspirations. Muscles corrugated in places; cough when present, suppressed and dry; auscultation detects a grating sound and a dull murmur at the chest. Pressure between the ribs produces great pain or makes the animal resentful. The head is turned very often toward the side; the fore foot paws; the breathing is short and jerking.

Treatment.—Should be active. Place in a loose box; bandage the legs; leave the body unclothed. Give, every quarter of an hour, a scruple of tincture of aconite in a wineglass of warm water. When pulse has softened give, every second hour, sulphuric ether and laudanum, of each one ounce; water, half

a pint. Do nothing for the bowels. Place lukewarm water within easy reach of the head, and give nothing more while the disease rages. After the affection subsides, blister throat and chest. If the horse is costive, administer enemias; or feed cut grass with the other food; and feed carefully for some time.

*POLL EVIL.

Symptoms.—The nose is protruded and the head kept as motionless as possible; the animal hangs back when it is feeding from the manger. Pressure or enforced motion excites resistance. Swelling; the swelling bursts in several places, from which exudes a foul, fistulous discharge. Pus has been secreted; confinement has caused it to decay, while motion and fascia have occasioned it to burrow.

Treatment.—Paint the part lightly with tincture of cantharides or acetate of cantharides. Do this daily till vesication is produced, then stop. When the swelling enlarges, open the prominent or soft places. Allow the pus to issue; then cut down on the wound till the seat of the disease is gained. Use a proper knife, and include as many pipes as possible in one clean cut. All others should join this. Empty out all concrete matter. Wash the cavity with cold water. Excise all loose pieces of tendon and unhealthy flesh. Moisten the sore with the chloride of zinc lotion, one grain to the ounce, and cover the wound with a cloth dipped in the solution of tar. If the disease has burst, still include the pipes in one smooth incision; clean out the concrete pus, and treat as has been directed. Spare the ligament which lies under the mane; and work in a breast-strap after recovery.

PRURIGO.

Symptom.—Itchiness. The horse rubs off hair; but a dry, corrugated surface is never shown.

Treatment.—Take away some hay; allow grass; give two bran mashes each day till the bowels are open. Apply the following: Sulphuric acid, one part; water, ten parts. Or, acetic acid, one part; water, seven parts. Drink: Liquor arsenicalis, one ounce; tincture of muriate of iron, one ounce and a half; water, one pint—half a pint to be given every night. Withdraw the drink a week after the disease has disappeared, and feed on sound oats, and if the horse is weak allow a quart of porter every day.

PUMICE FOOT.

Symptoms.—Bulging sole; weak crust; strong bars and good frog.

Treatment.—The only relief possible is afforded by a bar shoe of the dish kind, and a leathern sole. The constant use of equal parts of animal glycerine and tar is beneficial to the hoof.

***PURPURA HEMORRHAGICA OR UNIVERSAL CONGESTION.**

Symptoms.—The attack is sudden. The body, head and limbs enlarge; consciousness is partially lost. The horse stands, and the breathing is quickened. Through the skin there exudes serum with blood. The nostrils and lips enlarge and part of the swollen tongue protrudes from the mouth. The appetite is not quite lost, although deglutition is difficult. Thirst is great.

Treatment.—Give half an ounce of chloroform in a pint of linseed oil, in the first stage. Repeat the dose in half an hour. No amendment following, give two ounces of sulphuric ether in one pint of cold water. In half an hour repeat the dose if necessary. Send for a veterinarian as soon as the first symptoms are observed.

***QUITTOR.**

Causes.—Confined pus from suppurating corn, or prick of the sole; matter results, and this issues at the coronet, or from injury to the coronet, generating pus, and this burrows downward, as it cannot pierce the coronary substance. The secretion may also penetrate the cartilage, and thus establish sinuses in almost every possible direction.

Symptoms.—The horse is very lame. The animal is easier after the quitter has burst. Probe for the sinuses. If, after the superficial sinuses are treated, among the creamy pus there should appear a dark speck of albuminous fluid, make sure of another sinus, probably working toward the central structures of the foot. It should be treated by a surgeon.

RHEUMATISM.

Symptoms.—Lameness or inability to use the part, the horse, when forced to do so, giving expressions of severe pain. If the shoulder is affected, the foot is not put to the ground, and when the leg is moved backward and forward by the hand, great pain is evidently experienced. In severe cases there is fever with accelerated pulse (70 to 80) accompanied often by profuse sweating, and heaving at the flanks, the legs remaining warm. After a short time the part swells and is excessively tender.

Treatment.—Copious bleeding, if the horse is plethoric; indeed, in severe cases it should be carried

on till the pulse is greatly reduced, and repeated the next day, if it returns to its original hardness and fullness. The bowels should be acted on as soon as it is safe to do so, and if the dung is very hard backing and clysters should be used, to accelerate the action of the medicine. The best aperient is castor oil, of which a pint may be given with an ounce of sweet spirits of nitre. When this has acted, if the kidneys are not doing their duty, a quarter of an ounce of nitre and a drachm of camphor may be made into a ball and given twice a day.

Chronic rheumatism of the muscles is similar in its nature to the acute form, but, as its name implies, it is more lasting, and of less severity. It often flies from one part to another, attacking the ligaments and tendons, as well as the muscular fibers. It is seldom much under control, and the general health should be attended to, rather than a removal of the difficulty. In fact, in all cases of rheumatism, warmth, good care, careful nursing, and such gentle exercise as the animal may be able to take are the key to success.

SANDCRACK.

Symptoms.—Quarter crack occurs on light horses upon the inner side of the hoof. It usually commences at the coronet, goes down the foot, and reaches to the laminae. Toe crack occurs in heavy horses in front. From the sensitive laminae, when exposed, fungoid granulations sometimes sprout, which, being pinched, produce excessive pain and acute lameness.

Treatment.—Always pare out the crack, so as to convert it into a groove. When the crack is partial, draw a line with a heated iron above and below the fissure. If granulations have sprouted, cleanse the wound with chloride of zinc lotion, one grain to the ounce of water, and then cut them off. Afterward place the foot in a poultice. Subsequently pare down the edges of the crack while the horn is soft. Use the lotion frequently. Draw lines from the coronet to the crack, so as to cut off communication between the fissure and the newly-secreted horn. Shoe with a bar shoe, having the seat of crack well eased off and also clip on either side. If the horse must work, lay a piece of tow saturated with the lotion into the crack; bind the hoof tightly with wax-end. Tie over all a strip of cloth, and give this a coating of tar. When the horse returns, inspect the

part. Wash out all of the grit with chloride of zinc lotion.

SEEDY TOE.

Symptom.—A separation between the crust of the coronet and the soft horn of the laminae, commencing at the toe of the foot.

Treatment.—Remove the shoe. Probe the fissure, which will be exposed. Cut away all the separated crust. Until the removed portion has grown again, feed liberally, but do not allow labor.

SIMPLE OPHTHALMIA.

Symptoms.—Tears; closed eyelid; the ball of the eye becomes entirely or partially white.

Treatment.—Remove any foreign body; fasten a cloth across the forehead; moisten it with a decoction of poppy-heads to which some tincture of arnica has been added. If a small abscess should appear on the surface of the eye, open it and bathe with chloride of zinc lotion. Should inflammation be excessive, puncture eye vein, (the vein running up the side of the face) and place some favorite food on the ground.

SITFAST.

Symptom.—The hard, bare patch is surrounded by a circle of ulceration.

Treatment.—With the knife remove the thickened skin. Apply chloride of zinc, one grain; water, one ounce, to the wound. Attend to the bowels. Feed liberally; exercise well; and give, night and morning, liquor arsenicalis, half an ounce; tincture of muriate of iron, three-quarters of an ounce; water, one pint. Mix.

*SPASMODIC COLIC—FRET—GRIPES.

Symptoms.—1st Stage.—Horse is feeding; becomes uneasy; ceases eating; hind foot is raised to strike the belly; fore foot paws the pavement; the nose is turned toward the flank, and an attack of fret is recognized. 2d Stage.—Alternate ease and fits of pain; the exemptions grow shorter as the attacks become longer; the horse crouches; turns round; then becomes erect; pawing, etc., follow; a morbid fire now lights up the eyes. 3d Stage.—Pains lengthen; action grows more wild; often one foot stamps on the ground; does not feed, but stares at the abdomen; at last, without warning, leaps up and falls violently on the floor; seems relieved; rolls about till one leg rests against the wall; should no assistance be now afforded, the worst consequences may be anticipated.

Treatment.—Place in a loose box, guarded by trusses of straw ranged against the walls. Give one ounce each of sulphuric ether and laudanum in a pint of cold water, and repeat the dose every ten minutes if the symptoms do not abate. If no improvement be observed double the active agents, and at the periods stated persevere with the medicine. A pint of turpentine dissolved in a quart solution of soap, as an enema, has done good. No amendment ensuing, dilute some strong liquor ammonia with six times its bulk of water, and saturating a cloth with the fluid, hold it by means of a horse-rug close to the abdomen. It is a blister; but its action must be watched or it may dissolve the skin. If, after all, the symptoms continue, there must be more than simple colic to contend with.

*SPAVIN.

Symptom.—Any bony enlargement upon the lower and inner side of the hock. Prevents the leg being flexed. Hinders the hoof from being turned outward. Causes the front of the shoe to be worn and the toe of the hoof to be rendered blunt by dragging the foot along the ground. Leaves the stable limping; returns bettered by exercise.

Treatment.—View the suspected joint from before, from behind, and from either side. Afterward feel the hock. Any enlargement upon the seat of disease, to be felt or seen, is a spavin. Feed liberally, and rest in a stall. When the part is hot and tender, rub it with belladonna and opium, one ounce of each to an ounce of water. Apply a poultice. Or put opium and camphor on the poultice. Or rub the spavin with equal parts of chloroform and camphorated oil. The heat and pain being relieved, apply the following, with friction: Iodide of lead, one ounce; simple ointment, eight ounces. Only during the earlier stages can it be cured.

*SPECIFIC OPHTHALMIA.

Symptoms.—A swollen eyelid; tears; a hard pulse; sharp breathing; a staring coat; a clammy mouth; the nasal membrane is inflamed or leaden colored; the lid can only be raised when in shadow. The ball of eye reddened from the circumference; the pupil closed; the iris lighter than is natural. The disease may change from eye to eye; the duration of any visitation is very uncertain; the attacks may be repeated, and end in the loss of one or both eyes. If

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one eye only is lost, the remaining eye generally strengthens.

Treatment.—Place in a dark shed. Open the eye vein, and puncture the lid if needed; put a cloth saturated with cold water over both eyes. If the horse is poor, feed well; if fat, support, but do not cram; if in condition, lower the food. Sustain upon a diet which requires no mastication. Give the following ball twice daily: Powdered colchicum, two drachms, iodide of iron, one drachm; calomel, one scruple; make up with extract of gentian. So soon as the ball affects the system, change it for liquor arsenicalis, three ounces; muriated tincture of iron, five ounces. Give half an ounce in a tumbler of water twice daily. See the stable is rendered pure before the horse returns to it, since the disease is often caused by the fumes of a filthy stable.

*SPLINT.

Symptom.—Any swelling upon the inner and lower part of the knee of the fore leg, or any enlargement upon the shin-bone of either limb. On the knees they are important, as they extend high up. On the shin they are to be dreaded, as they in terfere with the movements of the tendons. All are painful when growing, and in that state generally cause lameness. The cut shows three serious varieties of splint; viz:



Three specimens of Splint.

1. A splint involving the bones of the knee-joint.
2. A splint interfering with the action of the back sinews.
3. A small splint situated under the tendon of an extensor muscle.

Treatment.—Feel down the leg. Any heat, tenderness, or enlargement is proof of a splint. If, on the trot, one leg is not fully flexed, or the horse "dishes" with it, it confirms the opinion. Time and liberal food are the best means of perfecting them. When they are painful poultice, having sprinkled on the surface of the application one drachm each of opium and camphor. Or rub the place with one drachm of chloroform and two drachms of camphorated oil. Periosteotomy is sometimes of service. When a splint interferes with a tendon, the only chance of cure is to open the skin and cut off the splint, afterward treating the wound with a lotion composed of chloride of zinc, one grain; water, one ounce. To

check the growth of a splint rub it well and frequently with iodide of lead, one ounce; simple ointment, eight ounces. Periosteotomy should be performed by a competent surgeon. The operation consists in cutting the periosteum (the membrane covering the bone) with a narrow bladed bistouri.

*SPRAIN OF THE BACK SINOWS.

Symptom.—Gradual heightening of the hind heel.

Treatment.—The only possible relief is afforded by an operation—"division of the tendons."

*STAGGERS.

Symptoms.—Excessive thirst; dullness or sleepiness; snoring; pressing the head against a wall. Some animals perish in this state; others commence trotting without taking the head from the wall, and such generally die, but sometimes recover. Other horses quit the sleepy state; the eyes brighten; the breath becomes quick. Such animals exhibit the greatest possible violence, but without the slightest desire for mischief.

Treatment.—Allow no water. Give a quart of oil. Six hours afterward give another quart of oil, with twenty drops of croton oil in it, should no improvement be noticed. In another six hours, no amendment being exhibited, give another quart of oil, with thirty drops of croton oil in it. After a further six hours, repeat the first dose, and administer the succeeding doses, at the intervals already stated, until the appearance changing indicates that the body has been relieved.

Sleepy staggers and mad staggers are different stages of the same disorder, for the full development of the mad stage no remedies are of the slightest avail. A horse subject to the disease is dangerous to ride or drive.

*STRAIN OF THE FLEXOR TENDONS.

Symptoms.—The animal goes strangely, not lame. The defective action will disappear upon rest, but stiffness is aggravated by subsequent labor. Any attempt to work the horse induces incurable lameness or contraction of the tendons.

Treatment.—Allow several hours to elapse before any attempt is made to discover the disease. A small swelling, hot, soft and sensitive, may then appear. Bind round it a linen bandage, and keep it wet with cold water. Have men to sit up bathing this for the three first nights; afterward apply moisture only by day. Allow no exercise. Give

four drachms of aloes. Do not turn out, but allow two feeds of oats each day. Keep in a stall, and do not put to work till more than recovered.

STRINGHALT.

Symptom.—Raising one hind leg, or one after the other, previous to starting.

Treatment.—No possible treatment can relieve.

SURFEIT.

Symptom.—An eruption of round, blunt and numerous spots.

Treatment.—If the pulse is not affected the symptom may disappear in a few hours. Look to the food. Take away hay, and allow grass or bran mash. Increase the oats. The following drink will be of service: Liquor arsenicalis, one ounce; tincture of muriate of iron, one ounce and a half; water, one quart. Mix. Give daily, one pint for a dose. If the disease is constitutional keep the stable aired, and attend to cleanliness. Feed as previously directed, and allow bran mash when the bowels are constipated. Administer the drink recommended above, night and morning. Clothe warmly; remove from a stall to a loose box. Should the pulse suddenly sink, allow two quarts of porter each day. If the appetite fail, give gruel instead of water, and feed some cut carrots from the hand.

* THE TEETH.

Symptoms of Toothache.—Head carried on one side, or pressed against the wall; saliva dribbles from the lips; quidding or partial mastication of the food, and allowing the morsel to drop from the mouth. Appetite capricious; sometimes spirit is displayed—then the horse is equally dejected. The tooth dies; the opposing tooth grows long. The opposite teeth become very sharp, from the horse masticating only on one side. The long tooth presses upon the gum and provokes nasal gleet. If toothache is suspected consult a veterinarian.

* THOROUGH-PIN.

Symptom.—A round tumor going right through the leg, and appearing anterior to the point of the hock. It is nearly always connected with bog spavin.

Treatment.—Never attack thorough-pin and bog spavin at the same time. Relieve the thorough-pin first by means of rags, cork, and an India-rubber bandage, cut so as not to press on the bog spavin. If the corks occasion constitutional symptoms, use a truss to press upon the thorough-pin, which, being destroyed, apply a perfect bandage and wetted cloths

to the bog spavin. When attempting to cure bog spavin, however, continue the remedy to the thorough-pin, or the cure of one affection may reproduce the other.

* THRUSH.

Symptoms.—A foul discharge running from the cleft of the frog. This decomposes the horn. The surface of the frog becomes ragged, and the interior converted into a white powder. The affection does not generally lame; but should the horse tread on a rolling stone, it may fall as though it were shot.

Treatment.—Pare away the frog till only sound horn remains, or until the flesh is exposed. Then tack on the shoe and return to a clean stall. Apply the chloride of zinc lotion—three grains to the ounce of water—to the cleft of the frog by means of some tow, wrapped round a small bit of stick. When the stench has ceased, a little liquor of lead will perfect the cure. For contracted feet pare the frog, and every morning dress once with the chloride of zinc lotion; but do not strive to stop the thrush.

TUMORS.

These are so various and of such different natures that in every case a surgeon should be consulted.

WARTS.

There are three kinds of warts. 1. Contained in a cuticular sac, and upon this being divided, shells out. 2. The cartilaginous and vascular. These grow to some size and are rough on the surface. They are apt to ulcerate. 3. A cuticular case, inclosing a soft granular substance.

When of the first kind slit up and squeeze them out. The second kind cut off and apply a heated iron to stop the bleeding. The third kind (fully red) had better be let alone.

WINDY COLIC.

Symptoms.—Uneasiness; pendulous head; cessation of feeding; breathing laborious; fidgets; rocking the body; enlargement of the belly; pawing. Standing in one place; sleepy eye; heavy pulse; flatulence; the abdomen greatly enlarged. Breathing very fast; pulse very feeble; blindness; the animal walks round and round till it falls and dies.

Treatment.—Three balls of sulphuret of ammonia, two drachms, with extract of gentian and powdered quassia, of each a sufficiency, may be given, one every half hour. Next, one ounce of chloride of potash, dissolved in a pint of cold water, and mingled with sulphuric ether; two ounces should be turned

down. In an hour's time, two ounces each of sulphuric ether and of laudanum; half an ounce of camphorated spirits, one drachm of carbonate of ammonia may be administered. No good effect being produced throw up a tobacco-smoke enema. As a last resort, procure a stick of brimstone and light it. Remain in the stable while it burns, or the sulphurous fumes may become too powerful for life to inhale them. Continue this measure for two hours; then repeat the remedies previously recommended. All being fruitless, puncture the abdomen with a trocar or knife as a desperate remedy. Cut page 127.

GENERAL SPECIFIC TREATMENT OF WOUNDS.

A lacerated wound is generally accompanied by contusion, but with little hemorrhage. Shock to the system is the worst of its primary effects. The danger springs from collapse. A slough may probably follow. The slough is dangerous in proportion as it is tardy. The horse may bleed to death if the body is much debilitated.

Treatment.—Attend first to the system. Give a drink composed of sulphuric ether and laudanum, of each one ounce; water, half a pint. Repeat the medicine every quarter of an hour if necessary, or till shivering has ceased and the pulse is healthy. A poultice, made of one-fourth brewer's yeast, three-fourths of any coarse meal; or a lotion, consisting of tincture of cantharides, one ounce; chloride of zinc, two drachmas; water, three pints, may be employed. When the slough has fallen apply frequently a solution of chloride of zinc, one grain to the ounce of water; and regulate the food by the pulse.

An incised wound produces little shock. The danger is immediate, as the horse may bleed to death.

Treatment.—Do not move the horse. Dash the part with cold water, or direct upon the bleeding surface a current of wind from the bellows. When the bleeding has ceased and the surfaces are sticky, draw the edges together with divided sutures. See page 129. When the sutures begin to drag cut them across. After copious suppuration has been established bathe frequently with the solution of chloride of zinc, one grain to the ounce of water.

An abraded wound is generally accompanied by grit or dirt forced into the denuded surface. The pain is so great the animal may sink from irritation.

Treatment.—Cleanse, by squeezing water from a

large sponge above the wound, as was directed for broken knees, and allow suppuration to remove any grit that is fixed in the flesh. Support the body, and use the chloride of zinc lotion.

A punctured wound is dangerous, as the parts injured are liable to motion. On this account those above the stifle are very hazardous. Sinuses form from the torn fascia opposing the exit of the pus; also because the small hole in the skin generally bears no proportion to the internal damage.

Treatment.—Always enlarge the external opening to afford egress to all sloughs and pus. Regulate the food by the symptoms, and use the chloride of zinc lotion.

A contused wound, when large, causes more congealed blood than can be absorbed. This corrupts, and a slough must occur or an abscess must form. Either generates weakness, produces irritation, and may lead to fatal hemorrhage. Or sinuses may form. Wherefore, such accidents are not to be judged of hastily.

Treatment.—When the contusion is slight rub the part with iodide of lead, one drachm of the salt to an ounce of lard. When large divide the skin, every eighth inch, the entire length of the swelling. Bathe the injury with the chloride of zinc lotion, and support the body, as the symptoms demand liberality in the matter of food.

In all wounds gain, if possible, a large depending orifice, and cover the denuded surfaces with a rag saturated with oil of tar, or solution of tar.

CHAPTER XIX.

DESIGNATION OF REMEDIES AND PREPARATIONS UNDER WHICH THE SEVERAL FORMULAS MAY BE ADMINISTERED.

SECTION I.—THE COLLECTION OF FORMULAS.

The collection of formulas requires careful attention, that they may be strictly correct, and applicable to the necessities of a case. In all cases when the farmer or breeder is in doubt, he should, as before stated, apply to a veterinarian. If he be a true man he will not find fault with the remedies which may have been used, but will proceed to combat the special requirements of the case. It is only the quack who holds that only the special formulas are correct, and the simples of the farmer, or the prescriptions of the best surgeons, here formulated into connected shape, of no use. In nine cases out of ten

he has thus gotten his own knowledge, and generally in so superficial a manner as not to be reliable. The quack is also more liable to be in error as to the true nature of the symptoms than the carefully read breeder. In case there is no really good veterinarian near, get the advice of your family physician. His advice will be valuable, and the humane physician does not, nowadays, disdain to assist his neighbors in the treatment of animal servants when a veterinarian cannot be had. In fact, many able physicians now combine the two branches of the profession, both in surgery and medicine. The symptoms and medicines in all that follows are to assist in determining diseases.

That the whole matter of the treatment of animals may be complete, we have excerpted and edited from Stonehenge—who combined a thorough knowledge of the horse with practical experience in diseases—as formulated by him from the best authorities, a list, proper and applicable in diseases and injuries. The explanations will indicate when they may be used. It will be found a valuable addition to the special cases we have treated of. The list is arranged alphabetically and needs no further introduction.

SECTION II.—ALTERATIVES.

This term is not very scientific, but it is in very general use, and easily explains its own meaning, though the *modus operandi* of the drugs employed to carry it out is not so clear. The object is to replace unhealthy action by a healthy one, without resorting to any of the distinctly defined remedies, such as tonics, stomachics, etc. As a general rule, this class of remedies produce their effect by acting slowly but steadily on the depuratory organs, as the liver, kidneys and skin. The following may be found useful:

1. In disordered states of the skin—

Emetic Tartar,	5 oz.
Powdered Ginger,	3 oz.
Opium,	1 oz.

Syrup enough to form 16 balls; one to be given every night.

2. Simply cooling—

Barbadoes Aloes,	1 oz.
Castile Soap,	1½ oz.
Ginger,	½ oz.

Syrup enough to form 6 balls; one to be given every morning. Or,

3. Barbadoes Aloes, 1½ drachm.
- Emetic Tartar, 2 drachms.
- Castile Soap, 2 drachms.
- Mix.

4. Alternative ball for general use—

Black Sulphuret of Antimony,	2 to 4 drachms.
Sulphur,	2 drachms.
Nitre,	2 drachms.

Linseed meal and water enough to form a ball.

5. For generally defective secretions—

Flowers of Sulphur,	6 oz.
Emetic Tartar,	5 to 8 drachms.
Corrosive Sublimato,	10 grs.

Linseed meal mixed with hot water, enough to form six balls, one of which may be given two or three times a week.

6. In debility of stomach—

Calomel,	1 scruple.
Aloes,	1 drachm.
Cascarilla Bark,	} of each in powder,
Gentian Root,	
Ginger,	
Castile Soap,	3 drachms.

Syrup enough to make a ball, which may be given twice a week, or every other night.

SECTION III.—ANÆSTHETICS.

These either diminish sensation or produce insensibility to all external impressions, and therefore to pain. They resemble narcotics in their action, and, when taken into the stomach, may be considered purely as such. The most certain and safe way of administering them is by inhalation, and chloroform is the drug now universally employed. The *modus operandi* of the various kinds has never yet been satisfactorily explained; and when the comparison is made, as it often is, to the action of intoxicating fluids, we are no nearer to it than before. With alcoholic fluids, however, the disorder of the mental functions is greater in proportion to the insensibility to pain; and if they are taken in sufficient quantities to produce the latter effect, they are dangerous to life itself. The action of anæsthetics on the horse is very similar to that on man, and should only be administered by a veterinary surgeon.

ANODYNES,

sometimes called narcotics, when taken into the stomach, pass at once into the blood, and there act in a special manner on the nervous centers. At first they exalt the nervous force; but they soon depress it, the second stage coming on the sooner according to the increase of the dose. They are given either to soothe the general nervous system, or to stop diarrhoea; or sometimes to relieve spasm, as in colic or tetanus. Opium is the chief anodyne used in veterinary medicine, and it may be employed in very large doses:

7. Anodyne drench for colic—

Linseed Oil,	1 pint.
Oil of Turpentine,	1 to 2 ounces.
Laudanum,	1 to 2 ounces.

Mix, and give every hour till relief is afforded.

8. Anodyne ball for colic (only useful in mild cases)—

Powdered Opium,	$\frac{1}{2}$ to 2 drachms.
Castile Soap,	2 drachms.
Camphor,	2 drachms.
Ginger,	$1\frac{1}{2}$ drachms.

Make into a ball with licorice powder and treacle, and give every hour while the pain lasts. It should be kept in a bottle or bladder.

9. Anodyne ball (ordinary)—

Opium,	$\frac{1}{2}$ to 1 drachm.
Castile Soap,	2 to 4 drachms.
Ginger,	1 to 2 drachms.
Powdered Anise-seed,	$\frac{1}{2}$ to 1 oz.
Oil of Caraway Seeds,	$\frac{1}{2}$ drachm.

Syrup enough to form a ball, to be dissolved in half a pint of warm ale, and given as a drench.

10. Anodyne drench in superpurgation, or ordinary diarrhoea—

Gum Arabic,	2 oz.
Boiling water,	1 pint.
Dissolve, and then add—	
Oil of Peppermint,	25 drops.
Laudanum,	$\frac{1}{2}$ to 1 oz.

Mix, and give night and morning, if necessary.

11. In chronic diarrhoea—

Powdered Chalk and Gum Arabic, of each,	1 oz.
Laudanum,	$\frac{1}{2}$ oz.
Peppermint Water,	10 oz.

Mix, and give night and morning.

ANTACIDS.

As the term implies, these remedies are used to neutralize acids, whether taken into the stomach to an improper extent, or formed therein as products of diseases. They are often classed as alteratives, when used for the latter purpose. They include the alkalies and alkaline earths, but are not much used in veterinary medicine.

SECTION IV.—ANTHELMINTICS.

Drugs which are used to destroy worms receive this name in medical literature, when the author is wedded to the Greek language. The admirers of Latin call them vermifuges, and in English they receive the humble name of worm medicines. Their action is partly by producing a disagreeable or fatal impression on the worm itself, and partly by irritating the mucous lining of the bowels, and thus causing them to expel their contents.

12. Worm ball (recommended by Mr. Gamgee)—

Asafetida,	2 drachms.
Calomel,	$1\frac{1}{2}$ drachms.
Powdered Savin,	$1\frac{1}{2}$ drachms.
Oil of Male Fern,	30 drops.

Treacle enough to make a ball, which should be given at night, and followed by a purge next morning.

13. Mild drench for worms—

Linseed Oil,	1 pint.
Spirits of Turpentine,	2 drachms.

Mix and give every morning.

Anti-spasmodics are medicines which are intended to counteract excessive muscular action, called spasm, or, in the limbs, cramp. This deranged condition depends upon a variety of causes, which are generally of an irritating nature; and its successful treatment will often depend upon the employment of remedies calculated to remove the cause, rather than directly to relieve the effect. It therefore follows that, in many cases, the medicines most successful in removing spasm will be derived from widely separated divisions of the *materia medica*, such as aperients, anodynes, alteratives, stimulants and tonics. It is useless to attempt to give many formulas for their exhibition; but there are one or two medicines which exercise a peculiar control over spasm, and I shall give them without attempting to analyze their mode of operation.

14. In colic—

Spirits of Turpentine,	$3\frac{1}{2}$ oz.
Laudanum,	$1\frac{1}{2}$ oz.
Barbadoes Aloes,	1 oz.

Powder the aloes, and dissolve the warm water; then add the other ingredients, and give as a drench.

15. Clyster in Colic—

Spirits of Turpentine,	6 oz.
Aloes,	2 drachms.

Dissolve in three quarts of warm water, and stir the turpentine well into it.

16. Anti-spasmodic drench—

Gin,	4 to 6 oz.
Tincture of Capsicum,	2 drachms.
Laudanum,	3 drachms.
Warm Water,	$1\frac{1}{2}$ pints.

Mix, and give as a drench, when there is no inflammation.

SECTION V.—APERIENTS.

Aperients, or purges, are those medicines which quicken or increase the evacuations from the bowels, varying, however, a good deal in their mode of operation. Some act merely by exciting the muscular

coat of the bowels to contract; others cause an immense watery discharge, which, as it were, washes out the bowels; whilst a third set combine the action of the two. The various purges also act upon different parts of the canal, some stimulating the small intestines, whilst others pass through them without affecting them, and only act upon the large bowels; and others, again, act upon the whole canal. There is a third point of difference in purges, depending upon their influencing the liver in addition, which mercurial purgatives certainly do, as well as rhubarb and some others, and which effect is partly due to their absorption into the circulation, so that they may be made to act, by injecting into the veins, as strongly as by actual swallowing, and their subsequent passage into the bowels. Purgatives are likewise classed, according to the degree of their effect, into laxatives acting mildly, and drastic purges, or cathartics, acting very severely.

17. Ordinary physic balls—

Barbadoes Aloes,	3 to 8 drachms.
Hard Soap,	4 drachms.
Ginger,	1 drachm.

Dissolve in as small a quantity of boiling water as will suffice; then slowly evaporate to the proper consistence, by which means griping is avoided.

18. A warmer physic ball—

Barbadoes Aloes,	3 to 8 drachms.
Carbonate of Soda,	$\frac{1}{2}$ drachm.
Aromatic Powder,	1 drachm.
Oil of Caraway,	12 drops.

Dissolve as above, and then add the oil.

19. Gently laxative ball—

Barbadoes Aloes,	3 to 5 drachms.
Rhubarb Powder,	1 to 2 drachms.
Ginger,	2 drachms.
Oil of Caraway,	15 drops.

Mix, and form into a ball, as in No. 17.

20. Stomachic laxative balls, for washy horses—

Barbadoes Aloes,	3 drachms.
Rhubarb,	2 drachms.
Ginger,	1 drachm.
Cascarilla Powder,	1 drachm.
Oil of Caraway,	15 drops.
Carbonate of Soda,	$\frac{1}{2}$ drachms.

Dissolve the aloes as in No. 17, and then add the other ingredients.

21. Purgive balls, with calomel—

Barbadoes Aloes,	3 to 6 drachms.
Calomel,	$\frac{1}{2}$ to 1 drachm.
Rhubarb,	1 to 2 drachms.
Ginger,	$\frac{1}{2}$ to 1 drachm.
Castile Soap,	2 drachms.

Mix as in No. 17.

22. Laxative drench—

Barbadoes Aloes,	3 to 4 drachms.
Cannella Alba,	1 to 2 drachms.
Salt of Tartar,	1 drachm.
Mint Water,	8 oz.

Mix.

23. Another laxative drench—

Castor Oil,	3 to 6 oz.
Barbadoes Aloes,	3 to 5 drachms.
Carbonate of Soda,	2 drachms.
Mint Water,	8 oz.

Mix, by dissolving the aloes in the mint water by the aid of heat, and then adding the other ingredients.

24. A mild opening drench—

Castor Oil,	4 oz.
Epsom Salts,	3 to 5 oz.
Gruel,	2 pints.

Mix.

25. A very mild laxative—

Castor Oil,	4 oz.
Linseed Oil,	4 oz.
Warm Water or Gruel,	1 pint.

Mix.

26. Used in the staggers—

Barbadoes Aloes,	4 to 6 drachms.
Common Salt,	6 oz.
Flour of Mustard,	1 oz.
Water,	2 pints.

Mix.

27. A gently cooling drench in slight attacks of cold—

Epsom Salts,	6 to 8 oz.
Whey,	2 pints.

Mix.

28. Purgative clyster—

Common Salt,	4 to 8 oz.
Warm Water,	8 to 16 pints.

SECTION VI.—ASTRINGENTS

appear to produce contraction on all living animal tissues with which they come in contact, whether in the interior or on the exterior of the body; and whether immediately applied or by absorption into the circulation. But great doubt exists as to the exact mode in which they act; and, as in many other cases, we are obliged to content ourselves with their effects, and to prescribe them empirically. They are divided into stringents administered by the mouth, and those applied locally to external ulcerated or wounded surfaces.

29. For bloody urine—

Powdered Catechu,	$\frac{1}{2}$ oz.
Alum,	$\frac{1}{2}$ oz.
Cascarilla Bark in Powder,	1 to 2 drachms.

Liquorice powder and treacle, enough to form a ball, to be given twice a day.

30. For diabetes—
 Opium, $\frac{1}{2}$ drachm.
 Ginger, powdered, 2 drachms.
 Oak Bark, powdered, 1 oz.
 Alum, as much as the tea will dissolve.
 Camomile Tea 1 pint.
 Mix for a drench.
31. External astringent powders for ulcerated surfaces—
 Powdered Alum, 4 oz.
 Armenian Bole, 1 oz.
 Mix.
32. White Vitriol, 4 oz.
 Oxide of Zinc, 1 oz.
 Mix.
33. Astringent Lotion—
 Goulard Extract, 2 to 3 drachms.
 Water, $\frac{1}{2}$ pint.
 Mix.
34. Sulphate of copper, 1 to 2 drachms.
 Water, $\frac{1}{2}$ pint.
 Mix.
35. Astringent ointment for sore heels—
 Acetate of Lead, 1 drachm.
 Lard, 1 oz.
 Mix.
36. Another for the same—
 Nitrate of silver, powdered, $\frac{1}{2}$ drachm.
 Goulard Extract, 1 drachm.
 Lard, 1 oz.
 Mix, and use a very small portion every night—

SECTION VII.—BLISTER OR VESICANTS.

Blisters are applications which inflame the skin, and produce a secretion of serum between the cutis and cuticle, by which the latter is raised in the form of small bladders; but in consequence of the presence of the hair, these are very imperfectly seen in the horse. They consist of two kinds—one, used for the sake of counter-irritation, by which the original disease is lessened, in consequence of the establishment of this irritation at a short distance from it; the other, commonly called "sweating" in veterinary surgery, by which a discharge is obtained from the vessels of the part itself, which are in that way relieved and unloaded; there is also a subsequent process of absorption in consequence of the peculiar stimulus applied.

37. Mild Blister ointment (counter-irritant)—
 Hog's lard, 4 oz.
 Venice Turpentine, 1 oz.
 Powdered Cantharides, 6 drachms.
 Mix and spread.

38. Stronger blister ointment (counter-irritant)
 Spirits of Turpentine, 1 oz.
 Sulphuric Acid, by measure, 2 drachms.
 Mix carefully in an open place, and add—
 Hog's Lard, 4 oz.
 Powdered Cantharides, 1 oz.
 Mix and spread.

39. Very strong blister (counter-irritant)—
 Strong Mercurial Ointment, 4 oz.
 Oil of Origanum, $\frac{1}{2}$ oz.
 Finely powdered Euphorbium, 3 drachms.
 Powdered Cantharides, $\frac{1}{2}$ oz.
 Mix and spread.

40. Rapidly acting blister (counter-irritant)—
 Best Flour of Mustard, 8 oz.
 Made into a paste with water.
 Add Oil of Turpentine 2 oz.
 Strong Liquor of Ammonia, 1 oz.
 This is to be well rubbed into the chest, belly or back, in cases of acute inflammation.

41. Sweating blister—
 Strong Mercurial Ointment, 2 oz.
 Oil of Origanum, 2 drachms.
 Corrosive Sublimate, 2 drachms.
 Cantharides, powdered, 3 drachms.
 Mix, and rub in with the hand.

42. Strong sweating blister, for splints, ring-bones, spavins, etc.—
 Binioidide of Mercury, 1 to 1 $\frac{1}{2}$ drachm.
 Lard, 1 oz.
 To be well rubbed into the legs after cutting the hair short; and followed by the daily use of arnica, in the shape of a wash, as follows, which is to be painted on with a brush:
 Tincture of Arnica, 1 oz.
 Water, 12 to 15 oz.
 Mix.

43. Liquid sweating blisters—
 Cantharides,
 Spirits of Turpentine,
 Methylated Spirit of Wine, 1 pint.
 Mix, and digest for a fortnight; then strain.
44. Powdered Cantharides, 1 oz.
 Commercial Pyroligneous Acid, 1 pint.
 Mix, and digest for a fortnight; then strain.

SECTION VIII.—CAUSTICS, OR CAUTERIES.

Caustics are substances which burn away the living tissues of the body, by the decomposition of their elements. They are of two kinds, viz.: first, the actual caustic, consisting in the application of the burning iron, and called firing; and, secondly, the potential caustic, by means of the powers of the mineral caustics, such as potassa fusa, lunar-caustic, corrosive sublimate, etc.

The following are the ordinary chemical applications used as potential canteries:

45. Fused potass, difficult to manage, because it runs about in all directions, and little used in veterinary medicine.
 46. Lunar caustic, or nitrate of silver, very valuable to the veterinary surgeon, and constantly used to apply to profuse granulations.
 47. Sulphate of copper, almost equally useful, but not as strong as lunar caustic; it may be well rubbed into all high granulations, as in broken knuckles, and similar growths.
 48. Corrosive sublimate in powder, which acts most energetically upon warty growths, but should be used with great care and discretion. It may safely be applied to small surfaces, but not without a regular practitioner to large ones. It should be washed off after remaining on a few minutes.
 49. Yellow ointment is not so strong as corrosive sublimate, and may be used with more freedom. It will generally remove warty growths, by picking off their heads and rubbing it in.
 50. Muriate of Antimony, called butter of antimony; a strong but rather unmanageable caustic, and used either by itself or mixed with more or less water.
 51. Chloride of zinc is a most powerful caustic. It may be used in old sinuses in solution, seven drachms in a pint of water.
- Milder caustics:
52. Verdigris, either in powder or mixed with lard as an ointment, in the proportion of 1 to 3.
 53. Red precipitate, mixed and applied as in 52.
 54. Burnt alum, used dry in powder.
 55. Powdered white sugar.
- Mild liquid caustics:
56. Solution of nitrate of silver, 5 to 15 grains to the ounce of distilled water.
 57. Solution of blue vitriol, of about double the above strength.
 58. Chloride of zinc, 1 to 3 grains to the ounce of water.

SECTION IX.—CHARGES

are adhesive plasters which are spread while hot on the legs, and at once covered with short tow, so as to form a strong and unyielding support while the horse is at grass.

59. Ordinary charges—
- | | |
|-----------------|-------|
| Burgundy Pitch, | 4 oz. |
| Barbadoes Tar, | 6 oz. |
| Beeswax, | 2 oz. |
| Red Lead, | 4 oz. |

The three first are to be melted together, and afterward the lard is to be added. The mixture is to

be kept constantly stirred until sufficiently cold to be applied. If too stiff (which will depend upon the weather), it may be softened by the addition of a little lard or oil.

60. Arnica charge—

- | | |
|-------------------------|-------------------|
| Canada Balsam, | 2 oz. |
| Powdered Arnica Leaves, | $\frac{1}{2}$ oz. |
- The balsam to be melted and worked up with the leaves, adding spirits of turpentine if necessary. When thoroughly mixed, to be well rubbed into the whole leg, in a thin layer, and to be covered over with the charge No. 59, which will set on its outside and act as a bandage, while the arnica is a restorative to the weakened vessels. This is an excellent application.

SECTION X.—CLYSTERS, OR ENEMATA.

Clysters are intended either to relieve obstruction or spasm of the bowels, and are of great service when properly applied. They may be made of warm water or gruel, of which some quarts will be required in colic. They should be thrown up with the proper syringe, provided with valves and a flexible tube.

For the turpentine clyster in colic, see anti-spasmodics.

Aperient clysters, see aperients.

61. Anodyne clyster in diarrhoea—

- | | |
|------------------------------|------------|
| Starch, made as for washing, | 1 quart. |
| Powdered Opium, | 2 drachms. |
- The opium is to be boiled in water, and added to the starch.

SECTION XI.—CORDIALS

are medicines which act as temporary stimulants to the whole system, and especially to the stomach. They augment the strength and spirits when depressed, as after over-exertion in work.

62. Cordial balls—

- | | |
|-------------------------|------------|
| Powdered Caraway Seeds, | 6 drachms. |
| Ginger, | 2 drachms. |
| Oil of Cloves, | 20 drops. |

Treacle enough to make into a ball—

63. Powdered Anise-seed, 6 drachms.
 Powdered Cardamons, 2 drachms.
 Powdered Cassia, 1 drachm.
 Oil of Caraway, 20 drops.

Mix with treacle into a ball.

64. Cordial drench—

A quart of good ale warmed, and with plenty of grated ginger.

55. Cordial and expectorant—

- | | |
|----------------------|-------------------------|
| Powdered Anise-seed, | $\frac{1}{2}$ oz. |
| Powdered Squill, | 1 drachm. |
| Powdered Myrrh, | 1 $\frac{1}{2}$ drachm. |
- Balsam of Peru, enough to form a ball.

66. Liquorice Powder, $\frac{1}{2}$ oz.
 Gum Ammoniacum, 3 drachms.
 Balsam of Tolu, $1\frac{1}{2}$ drachm.
 Powdered Squill, 1 drachm.
 Linseed meal and boiling water, enough to form into a mass.

SECTION XII.—DEMULCENTS

are used for the purpose of soothing irritations of the bowels, kidneys or bladder; in the two last cases by their effect upon the secretion of urine.

67. Demulcent drench—
 Gum Arabic, $\frac{1}{2}$ oz.
 Water, 1 pint.
 Dissolve and give as a drench night and morning, or mixed with a mash.
 68. Linseed, 4 oz.
 Water, 1 quart.
 Simmer till a strong and thick decoction is obtained, and give as above.
 69. Marshmallow drench—
 Marshmallows, A double handful.
 Water, 1 quart.
 Simmer, as in No. 68, and use in the same way.

SECTION XIII.—DIAPHORETICS

have a special action on the skin, increasing the perspiration sometimes to an enormous extent.

70. Ordinary diaphoretic drench—
 Solution of Acetate of Ammonia, 3 to 4 oz.
 Laudanum, 1 oz.
 Mix, and give at night. Or,
 71. Solution of Acetate of Ammonia, 2 oz.
 Spirit of Nitrous Ether, 2 oz.
 Mix, and give as above.
 72. In hide-bound—
 Emetic Tartar, $1\frac{1}{2}$ drachm.
 Camphor, $\frac{1}{2}$ drachm.
 Ginger, 2 drachms.
 Opium, $\frac{1}{2}$ drachm.
 Oil of Caraway, 15 drops.
 Linseed meal and boiling water, to form a ball, which may be given twice or thrice a week.
 73. In hide-bound (but not so efficacious)—
 Antimonial Powder, 2 drachms.
 Ginger, 1 drachm.
 Powdered Caraways, 6 drachms.
 Oil of Anise-seed, 20 drops
 Mix as above.

These remedies require moderate exercise in clothing to bring out their effects, after which the horse should be whiped till quite dry.

SECTION XIV.—DIGESTIVES.

Digestives are applications which promote suppuration, and the healing of wounds or ulcers.

74. Digestive ointment—
 Red Precipitate, 2 oz.
 Venice Turpentine, 3 oz.
 Beeswax, 1 oz.
 Hog's Lard, 4 oz.

Melt the three last ingredients over a slow fire, and when nearly cold stir in the powder.

SECTION XV.—DIURETICS.

Diuretics are medicines which promote the secretion and discharge of urine, the effect being produced in a different manner by different medicines; some acting directly upon the kidneys by sympathy with the stomach, while others are taken up by the blood-vessels, and in their elimination from the blood cause an extra secretion of the urine. In either case their effect is to diminish the watery part of the blood, and thus promote the absorption of fluid effused into any of the cavities, or into the cellular membrane in the various forms of dropsy.

75. Stimulating diuretic ball—
 Powdered Resin, 3 drachms.
 Sal Prunelle, 3 drachms.
 Castile Soap, 3 drachms.
 Oil of Juniper, 1 drachm.
 Mix.
 76. A more cooling diuretic ball—
 Powdered Nitre, $\frac{1}{2}$ to 1 oz.
 Camphor, 1 drachm.
 Juniper Berries, 1 drachm.
 Soap, 3 drachms.
 Mix, adding linseed meal enough to form a ball.
 77. Diuretic powder for a mash—
 Nitre, $\frac{1}{2}$ to $\frac{3}{4}$ oz.
 R sin, $\frac{1}{2}$ to $\frac{3}{4}$ oz.
 Mix.
 78. Another more active powder—
 Nitre, 6 drachms.
 Camphor, $1\frac{1}{2}$ drachm.
 Mix.

SECTION XVI.—EMBRICATIONS.

Embrocations or liniments are stimulating or sedative external applications, intended to reduce the pain and inflammation of internal parts when rubbed into the skin with the hand.

79. Mustard embrocation—
 Best Flour of Mustard, 6 oz.
 Liquor of Ammonia, $1\frac{1}{2}$ oz.
 Oil of Turpentine, $1\frac{1}{2}$ oz.
 Mix with sufficient water to form a thin paste.
 80. Stimulating embrocation—
 Camphor, $\frac{1}{2}$ oz.
 Oil of Turpentine, $1\frac{1}{2}$ oz.
 Spirit of Wine, $1\frac{1}{2}$ oz.
 Mix.

81. Sweating embrocation for windgalls, etc.—
 Strong Mercurial Ointment, 2 oz.
 Camphor, $\frac{1}{2}$ oz.
 Oil of Rosemary, 2 drachms.
 Oil of Turpentine, 1 oz.
 Mix.

82. Another, but stronger—
 Strong Mercurial Ointment, 2 oz.
 Oil of Bay, 1 oz.
 Oil of Organum, $\frac{1}{2}$ oz.
 Powdered Cantharides, $\frac{1}{2}$ oz.
 Mix.

83. A most active sweating embrocation—
 Biniodide of Mercury, $\frac{1}{2}$ to 1 drachm.
 Powdered Arum Leaves, 1 drachm.
 Soap Liniment, 2 oz.
 Mix.

SECTION XVII.—EMULSIONS.

When oily matters have their globules broken down by friction with mucilaginous substances, such as gum arabic or yolk of egg, they are called emulsions, and are specially useful in soothing irritation of the mucous membrane, of the trachea, and bronchi.

84. Simple emulsion—
 Linseed Oil, 2 oz.
 Honey, 3 oz.
 Soft Water, 1 pint.
 Subcarbonate of Potass, 1 drachm.

Dissolve the honey and potass in the water; then add the linseed oil by degrees in a large mortar, when it should assume a milky appearance. It may be given night and morning.

85. Another more active emulsion—
 Simple Emulsion, No. 84, 7 oz.
 Camphor, 1 drachm.
 Opium, in powder, $\frac{1}{2}$ drachm.
 Oil of Anise-seed, 30 drops.

Rub the three last ingredients together in a mortar with some white sugar; then add the emulsion by degrees.

SECTION XVIII.—EXPECTORANTS.

Expectorants excite or promote a discharge of mucus from the lining membrane of the bronchial tubes, thereby relieving inflammation and allaying cough.

86. Expectorant ball in ordinary cough without inflammation—
 Gum Ammoniacum, $\frac{1}{2}$ oz.
 Powdered Squill, 1 drachm.
 Castile Soap, 2 drachms.
 Honey enough to form a ball.

87. In old standing cough (stomach)—
 Asafoetida, 3 drachms
 Galbanum, 1 drachm.
 Carbonate of Ammonia, $\frac{1}{2}$ drachm.
 Ginger, 1 $\frac{1}{2}$ drachm.
 Honey enough to form a ball.

88. A strong expectorant ball—
 Emetic Tartar, $\frac{1}{2}$ drachm.
 Calomel, 15 grains.
 Digitalis, $\frac{1}{2}$ drachm.
 Powdered Squills, $\frac{1}{2}$ drachm.
 Linseed meal and water enough to form a ball, which is not to be repeated without great care.

SECTION XIX.—FEBRIFUGES.

Febrifuges or fever medicines are given to allay the arterial and nervous excitements which accompany febrile action. They do this partly by their agency on the heart and arteries through the nervous system, and partly by increasing the secretions of the skin and kidneys.

89. Fever ball—
 Nitre, 4 drachms.
 Camphor, 1 $\frac{1}{2}$ drachm.
 Calomel and Opium, of each, 1 scruple.
 Linseed meal and water enough to form a ball. Or,
 90. Emetic Tartar, 1 $\frac{1}{2}$ to 2 drachms.
 Compound Powder of Tragacanth, 2 drachms.
 Linseed meal as above. Or,
 91. Nitre, 3 drachms.
 Camphor, 2 drachms.
 Mix as above.

92. Cooling powder for mash—
 Nitre, 6 drachms to 1 oz.
 May be given in a bran mash.

93. Cooling drench,—
 Nitre, 1 oz.
 Sweet Spirit of Nitre, 2 oz.
 Tincture of Digitalis, 2 drachms.
 Whey, 1 pint.
 Mix.

SECTION XX.—LOTIONS FOR WASHES

consist in liquids applied to the external parts, either to cool them or to produce a healthy action in the vessels.

94. Cooling solution for external inflammation—
 Goulard Extract, 1 oz.
 Vinegar, 2 oz.
 Spirits of Wine or Gin, 3 oz.
 Water, 1 $\frac{1}{2}$ pint.

Mix and apply with a cotton bandage.

95. Another, useful for inflamed legs, or for galled shoulders or back—
 Sal Ammoniac, 1 oz.
 Vinegar, 4 oz.
 Spirits of Wine, 2 oz.
 Tincture of Arnica, 2 drachms.
 Water, $\frac{1}{2}$ pint.
 Mix.

96. Lotion for foul ulcers—
 Sulphate of Copper, 1 oz.
 Nitric Acid, $\frac{1}{2}$ oz.
 Water, 8 to 12 oz.
 Mix.

97. Lotion for the eyes—

Sulphate of Zinc,	20 to 25 grains.
Water,	6 oz.

Mix.

98. Very strong one, and only to be dropped in—

Nitrate of Silver,	5 to 8 grains.
Distilled Water,	1 oz.

Mix and use with a camel-hair brush.

NARCOTICS.

A distinction is sometimes made between anodynes and narcotics, but in veterinary medicine there is no necessity for separating them. (See anodynes.)

REFRIGERANTS

lower the animal heat by contact with the skin, the ordinary ones being cold air, cold water, ice and evaporated lotions. (See lotions.)

SECTION XXI.—SEDATIVES.

These depress action of the circulatory and nervous systems, without affecting the mental functions. They are very powerful in their effects; and digitalis, which is the drug commonly used for this purpose, has a special quality known by the name of cumulative; that is to say, if repeated small doses are given at intervals for a certain time, an effect is produced almost equal to that which would follow the exhibition of the whole quantity at once. Besides digitalis, aconite is sometimes used to lower the action of the heart, and by many it is supposed to be equal in potency to that drug, without the danger which always attends its use. They are better used under the advice of a veterinarian.

SECTION XXII.—STIMULANTS.

By this term is understood those substances which excite the action of the whole nervous and vascular systems; almost all medicines are stimulants to some part or other, as, for instance, aperients, which stimulate the lining of the bowels, but to the general system are lowering. On the other hand, stimulants, so called, *par excellence*, excite and raise the action of the brain and heart.

Old Ale,	1 quart.
Carbonate of Ammonia,	$\frac{1}{2}$ to 2 drachms.
Tincture of C. ger,	4 drachms.

Mix and give as a drench.

For other stimulants see Cordials.

SECTION XXIII.—STOMACHICS.

Stomachics are medicines given to improve the tone of the stomach when impaired by bad management or disease.

Stomachic ball—

Powdered Gentian,	$\frac{1}{4}$ ounce.
Powdered Ginger,	1 $\frac{1}{2}$ drachms.
Carbonate of Soda,	1 drachm.

Treacle to form a ball. Or,

Cascarilla, powdered,	1 ounce.
Myrrh,	1 $\frac{1}{2}$ drachms.
Castile Soap,	1 drachm.

Mix, with syrup or treacle, into a ball. Or,

Powdered Colombo,	$\frac{1}{2}$ to 1 ounce.
Powdered Cassia,	1 drachm.
Powdered Rhubarb,	2 drachms.

Mix as in No. 101.

SECTION XXIV.—STYPTICS.

Styptics are remedies which have a tendency to stop the flow of blood either from internal or external surfaces. They are used either by the mouth or to the part itself in the shape of lotions, etc.; or the actual cautery, which is always best in external bleeding, may be employed. Sometimes, however, the part cannot be reached with the heated iron, and is yet within the influence of an injection, as in bleeding from the nostrils, for which the following may be employed:

Matteo Leaves,	$\frac{1}{4}$ ounce.
Boiling Water,	1 pint.

Infuse, and when cold strain and inject into the nostrils.

For internal styptics see Astringents.

TONICS.

These invigorate the whole body permanently, whilst stimulants only act for a short time. They are chiefly used after a low fever.

104. Tonic ball—

Sulphate of Iron,	$\frac{1}{4}$ ounce.
Extract of Camomile,	1 ounce.

Mix and form into a ball. Or,

105. Arsenic,	10 grains.
Ginger,	1 drachm.
Powdered Anise-seed,	1 ounce.
Compound Powder of Tragacanth,	2 drachms.

Syrup enough to form a ball. It is a very powerful tonic.

VERMIFUGES, OR WORM MEDICINES.

Described under the head of Anthelmintics, which see.

CHAPTER XX.

DRUGS AND MEDICAL APPLICATIONS.

VETERINARY DRUGS, WITH THEIR ACTIONS AND DOSES.

The use of drugs, and a knowledge of their action, and the proper doses, is important to every person

who keeps a horse. If he have studied the foregoing carefully it will be found more convenient sometimes to use than preparations of various drugs. We therefore append the list of such as may possibly be needed in the stable by the farmer and the breeder of stock:

ACETIC ACID; Distilled Vinegar.—Only used externally, as an ingredient in cooling lotions.

ACONITE; Monkshood, Wolfsbane.—A most active poison in large doses. Used medicinally, it is a powerful general sedative, anti-spasmodic, and anodyne; and by many practitioners it is preferred to digitalis. It is generally given as a tincture; for which see

ACONITE, Tincture of.—Take of root of *Aconitum Napellus*, dried and powdered, 16 ounces; rectified spirit, 16 fluid ounces. Macerate for four days; then strain, adding enough spirit to make it up to 24 ounces. Dose, 10 minims to 20 minims.

ALCOHOL; Spirit of Wine, known as rectified spirit and proof spirit.—The latter is used as a stimulant, in the dose of 2 to 6 ounces.

ALOES; Barbadoes is the kind of this drug which is chiefly used in veterinary practice.—Its action is cathartic in large doses, nauseating in medium doses, and tonic in small. Dose, from 2 drachms to 6 drachms. For the foal, five grains may be given for every week of its age.

ALOES, Horse or Caballine; an inferior and cheaper quality, generally the residue from the purification of Barbadoes and Socotrine aloes.

ALUM; Sulphate of Alumina and Potass.—Action, irritant, astringent and sedative. Dose, 2 drachms to 4 drachms.

AMMONIA, Liquor of; Caustic Ammonia, Spirit of Hartshorn.—A diffusible stimulant internally; externally, a strong irritant. Dose, 2 drachms to 6 drachms.

AMMONIA, Aromatic Spirit of, *Sal Volatile*.—Used in the same way as the liquor, which is generally substituted for it in veterinary medicine.

AMMONIA, Carbonate of.—A strong diffusible stimulant. Dose, 2 drachms to 4 drachms.

AMMONIA, Muriate of; *Sal Ammoniac*.—Only used externally, dissolved in water as a lotion, mixed with an equal quantity of nitre. One part of the mixture should be dissolved in sixteen parts of water, when it will lower the temperature 40° Fahrenheit.

ANISE-SEED.—Stomachic and carminative. Dose, 1 drachm.

ANTIMONY, Oxide of; Antimonial Powder.—Little used in veterinary medicine.

ANTIMONY, Sulphuret of.—A somewhat uncertain drug, alterative and anthelmintic. Dose, 2 drachms to 1 ounce.

ANTIMONY, Chloride of; Butter of Antimony.—Used as a caustic.

ANTIMONY, Tartarized; Tartar Emetic.—A very common febrifuge and anthelmintic for horses, but of late asserted by the authorities of the Edinburgh Veterinary College to be almost inert; and this assertion is supported by a number of experiments. Dose, 1 drachm to 6 drachms.

ARSENIC, White; Arsenious Acid.—In large doses, an irritant poison; in small ones, a tonic, and having also a peculiar effect on the skin. Dose, 5 to 10 grains.

ARSENIC, Fowler's Solution of; *Liquor Arsenicalis*.—A solution of white arsenic with potass in water, each ounce containing 4 grains of arsenious acid. Dose, 1½ ounces to 2 ounces.

ASAFCETIDA, Gum.—A mild stimulant, carminative and vermifuge. Dose, 2 drachms.

BELLADONNA; Deadly Nightshade.—A narcotic acrid poison in large doses; in small doses, anodyne and anti-spasmodic. Dose, 2 ounces of the dried leaves.

CALOMEL; Subchloride of Mercury.—Irritant, purgative, alterative, and antiphlogistic. Dose, 20 grains to 1 drachm.

CAMPHOR; a peculiar concretion from *Camphora officinarum*.—Slightly stimulant; then sedative and anti-spasmodic. Dose, 1 drachm to 4 drachms.

CANTHARIDES; Blistering; or Spanish Flies.—Given internally, irritant, stimulant, and diuretic; externally, rubefacient and vesicant. Dose, 4 grains to 20 grains.

CANTHARIDES, Ointment of; Blistering Ointment.

CANTHARIDES, Tincture of; Liquid Blister.—Powdered cantharides, 1 ounce; proof spirit, 16 ounces; digest for several days and strain. An active sweating or vesicating fluid.

CANTHARIDES ACETUM.—A solution in ten parts of acetic acid of one of powdered cantharides. More active than the liquid blister.

CASCARILLA; Bark of *Croton Eleuteria*.—A warm bitter tonic. Dose, 1 ounce to 2 ounces, generally made into an infusion.

CASTOR OIL; expressed from *Ricinus communis*.—Purgative. Dose, 1 pint.

CATECHU; Extract from *Acacia Catechu*.—Astringent and antiseptic. Dose, 2 drachms to 5 drachms.

CHALK; Carbonate of Lime.—Antacid and astringent in diarrhoea. Dose, 1 ounce to 2 ounces.

CHAMOMILE; Flowers of *Anthemis Nobilis*.—Stomachic, carminative, and mildly tonic. Dose, 1 to 2 ounces.

CHARCOAL; Carbon.—A powerful antiseptic; chiefly used externally to foul wounds.

CHLOROFORM.—Anæsthetic, stimulant, and antispasmodic. Inhaled in doses of from 2 to 6 ounces. Given internally. Dose, 1 drachm to 2 drachms.

CINCHONA; Bark of several species of Cinchona.—Astringent and tonic. Dose, 1 ounce to 3 ounces.

COLCHICUM; Meadow Saffron.—Cathartic, diuretic, and sedative. Dose of the root or seeds, half a drachm to 2 drachms.

COPPER, Sulphate of.—Tonic and astringent. Used externally it is a mild caustic. Dose, 1 drachm to 2 drachms.

COPPER, Subacetate of; Verdigris.—An external application in grease and quitor.

CORROSIVE SUBLIMATE, Chloride of Mercury.—An irritant poison. Used as a caustic, or as a wash, dissolved in water, for mange, lice, etc.

CREOSOTE.—Sedative, anodyne, astringent, and antiseptic. Dose, 20 to 30 minims. Used externally in skin diseases, mixed with lead or oil—1 drachm to 3 or 4 ounces.

CROTON OIL AND SEEDS; *Croton Tiglium*.—Internally a strong cathartic; externally a counter-irritant. Dose, 10 to 15 seeds; of the oil 15 to 20 drops.

DIGITALIS; Foxglove; leaves of *Digitalis Purpurea*.—A strong sedative and diuretic. Dose, of the powdered leaves, 20 to 30 grains.

ETHER, Sulphuric.—Stimulant, narcotic, and antispasmodic. Dose, 1 ounce to 3 ounces.

ETHER, Spirit of Nitric.—See Sweet Spirit of Nitre.

GALLS; Excrescences of *Quercus Infectoria*.—A powerful astringent. Dose, 4 drachms to 6 drachms.

GALLIC ACID; Tannin exposed to air and moisture.—Dose, $\frac{1}{2}$ drachm to 1 drachm.

GENTIAN; Root of *Gentiana Lutea*.—A bitter stomachic and tonic. Dose, 4 drachms to 8 drachms.

GINGER; Root of *Zingiber officinale*.—Stomachic, cordial, and carminative. Dose, 1 ounce.

GLYCERINE; A bland animal product.—A most useful emollient external application.

GUM ARABIC.—Useful for making a soothing mucilaginous emulsion. Dose, dissolved in water 1 ounce.

GUM TRAGACANTH.—Similar in its action and dose to Gum Acacia.

HELLEBORE, WHITE.—See *Veratrum*.

HEMLOCK; Leaves of *Conium Maculatum*.—Of little value as a medicine for the horse.

HENBANE; Leaves of *Hyoscyamus Niger*.—Not much used.

IODINE is given internally to produce absorption of morbid growths. Dose, 1 drachm to $1\frac{1}{2}$ drachms. Externally it is applied in the form of tincture.

IODIDE OF POTASSIUM.—See Potassium, Iodide of.

IRON, Sulphate of; Green Vitriol.—Astringent and tonic. Dose, 1 drachm to 3 drachms.

JUNIPER BERRIES.—Carminative and diuretic. Dose, 1 ounce to 3 ounces.

LEAD, Oxide of; Litharge.—Used to make various plasters.

LEAD, Acetate of.—Internally astringent, but not powerfully so in the horse. Dose, 20 to 60 grains. Externally useful in the form of solution as Goulard's extract, and with lard, etc., as the cerate of acetate of lead.

LINSEED; *Linum Usitatissimum*; Flax seeds.—Used scalded as an emollient food, and for fattening purposes, in quantities of 4 to 6 ounces.

LINSEED OIL.—A mild purgative. Dose, 1 pint to 2 pints.

MAGNESIA, Sulphate of.—Epsom salts, an uncertain cathartic, but generally diuretic. Dose, 1 pound to 2 pounds.

MARSH-MALLOWS; Root of *Althea officinalis*.—A mucilaginous emulsion; is made by boiling.

MERCURIAL OINTMENT; *Unguentum Hydrargyri*.—Used externally for mange and lice.

MERCURY, Ammonio-Chloride of; White Precipitate.—Used as a local application to kill lice.

MERCURY, Nitrate of.—Used mixed with lard, etc., to form an ointment, which is efficacious as a mild stimulant.

MAGNESIA, Carbonate of.—A mild aperient for foals; see Rhubarb.

MURIATIC ACID; Hydrochloric Acid.—In small doses, tonic, 1 drachm diluted with water.

MUSTARD; Flour of the seeds of *Sinapis Nigra*.—

Instant applied externally, but not very active in the horse.

NITRIC ACID.—A tonic when largely diluted. Dose 1 drachm to 2 drachms.

NUX VOMICA.—A stimulant to the nerves, and useful in paralysis. Dose 1 drachm.

OLIVE OIL.—Chiefly used as an ingredient in liniments.

OPUM; Juice of the *Papaver Somniferum*.—Primarily stimulant. Then narcotic and anodyne. Dose, 1 drachm to 2 drachms.

POTASSA FUSA; Caustic Potash.—An active caustic, but not very manageable.

POTASSIUM, Iodide of.—Diuretic and deobstruent, having the property of causing the absorption of morbid growths. Dose, 2 drachms to 4 drachms.

POTASS, Nitrate of.—The nitre, saltpetre, diuretic and vefrífuge. Dose, 6 to 8 drachms.

POTASS, Acetate of.—The same as the nitrate, but milder in its effects on the kidneys.

PRUSSIC ACID; Hydrocyanic Acid.—Used in the form of diluted hydrocyanic acid, to reduce the action of the heart. Dose, 20 to 30 minims.

PYROXYLIC ACID; Medicinal Naphthm.—Narcotic, having a special action on the bronchial mucous membrane. It is used in chronic cough. Dose, $\frac{1}{2}$ ounce.

RESIN, or Rosin.—An active diuretic. Dose, 1 ounce to 2 ounces.

RHUBARB; Root of *Rheon Palmatum*.—A mild purgative and stomachic, chiefly employed for foals, combined with magnesia.

SAVIN; Tops of *Juniperus Sabina*.—Anthelmintic. The essential oil is the best form. Dose, 3 to 4 drachms.

SILVER, Nitrate of, Lunar Caustic; Lapis Infernalis.—Used externally in the solid form and in solution.

SODIUM, Chloride of, Common salt.—A useful addition to the diet of horses.

SPERMACETI OINTMENT.—A very useful foundation for several external applications.

SULPHUR.—An efficacious remedy in several skin diseases.

SULPHUR OINTMENT, Compound.—Sulphur, $\frac{1}{2}$ pound; white hellebore, 2 ounces; nitre, 1 drachm; soft soap, $\frac{1}{2}$ pound; lard, $1\frac{1}{2}$ pound; mix. The

most useful application, when united with turpentine, in mange.

SULPHURIC ACID.—A powerful caustic, only used externally.

SWEET SPIRIT OF NITRE.—Diuretic, diaphoretic, anti-spasmodic, and stimulant. Dose, 1 ounce to 2 ounces.

TANNIC ACID.—Powerfully stringent. Dose, 20 to 30 grains.

TAR; Pis Liquid.—Used externally as an ingredient in ointments, and as a stimulant to the growth of horn.

TURPENTINE, Spirit of; Oil of Turpentine.—An excellent antispasmodic, diuretic and vermífuge. Dose, 1 ounce to 3 ounces; or as a diuretic, $\frac{1}{2}$ ounce to 1 ounce.

VERATRUM ALBUM; White Hellebore.—Sedative; for which purpose it is highly lauded by Mr. Percivall, who gave it in doses of 20 to 30 grains. Externally it forms an ingredient in several ointments.

ZINC, Carbonate of; Calamine.—Used externally in the form of an ointment.

ZINC, Oxide of.—Used externally as a mild, soothing ointment, mixed with lard.

ZINC, Sulphate of; White Vitriol.—Dissolved in water to form a wash for the eyes.

ZINC, Chloride of.—A strong caustic and antiseptic.

CHAPTER XXI.

SOME THINGS EVERY HORSEMAN SHOULD KNOW.

SECTION I.—THE PULSE AS INDICATING DISEASE.

Strong, Full Pulse.—The pulse in health is strong, full and with an even, steady throb, under excitement; if the pulse is strong and full, but with a vibratory hardness, disease is indicated. Although abnormal, both the strong full and the soft full pulse indicate health if regular.

Weak, Small Pulse.—There are two forms of this pulse. The weak small, and the soft small pulse. They both indicate weakness and debility; great debility of the pulse can be extinguished (prevented from acting) by the finger.

Intermittent Pulse.—There will be two, three or four regular beats, then a cessation for a short time. It may also be irregular in strength, indicating functional or structural disease, frequently heart dis-

ease. All irregularities and intermissions, if marked, indicate disease of the heart.

Very Slow Pulse.—This indicates disease or injury to the brain or spinal cord.

A Throbbing Pulse.—This in the region of any part, inflamed or congested, indicates the nature and in a degree the intensity of local disease.

The Oppressed Pulse.—Here the artery is full, but the beat is indistinct. It shows congestion and inflammation of the lungs.

The Wiry Pulse.—This is a hard, small pulse, as indicated by its name. Where found inflammation of the serous membranes, and of the white fibrous tissue may be suspected.

The Thready Pulse.—This is a small soft pulse, as its name indicates, and is found in great debility. If the pulse is quick, feeble, fluttering and almost imperceptible, speedy death is indicated.

VARIATIONS OF THE PULSE.

The pulse varies, under different circumstances, in disease from twenty to 120 per minute. The pulse may differ in the two sides of an animal. If it cannot be found at the left sub-maxillary (under the jaw) artery it may be felt on the right side. In disease, when difficult to find at the jaw, it may be felt at the arm, above the knee. In health the pulse of the fully grown horse, with the temperature of the air at about sixty degrees, is from thirty-two to thirty-six beats per minute. It is quicker in young than in aged horses, and slower in cold (low bred) than in well bred horses. The limit for the pulse beats in health may be stated at between twenty-six and forty beats per minute. Hence the necessity of knowing the normal pulse action, in health, of a particular animal to accurately determine diseased conditions.

SECTION II.—ON BLEEDING.

Bleeding is only to be practiced in cases of extreme necessity. In the majority of cases it is uncertain in its effects. It is a certain and powerful depressant and sedative, lessening the action of the heart and lungs. Bleeding should only be employed in the early stages of the disease, and when employed, blood enough should be taken to cause a marked alteration of the pulse. Never bleed when the pulse is quick and at the same time weak. It is worth repeating: unless in desperate cases, blood-letting should be abstained from, except under the advice of a competent veterinary surgeon. Modern

practice discourages bleeding, except in a few classes of disease.

SECTION III.—ABOUT CLYSTERS OR INJECTIONS.

Professionally these are called enemata. Their action softens and loosens hardened contents of the lower bowels, and by distention causes evacuation. The object of an enema is to rouse the powers of the intestines to action. The excitement of the lower intestines sometimes extends to the small intestines, rousing these also to action. A simple purgative for the horse is a half gallon of water, blood warm, or at a temperature of ninety-six degrees. Clysters must not be given violently, but gently. A bladder or gutta percha and rubber tube, six inches long, may hold the liquid. If stimulation is required, add a little common salt to the warm water, and before administering, it is better that the horse be back-raked. That is, so much of the hardened dung, as may be, is removed by the well-oiled hand. Care must be taken in this operation. A nutritive enema consists of a quart of gruel or rice water. An astringent enema for checking diarrhoea may be made of two drachms of catechu and two drachms of opium in a gallon of water; or, a quart of starch in three quarts of water, blood warm, may be first tried.

An enema for allaying spasms of the intestines may be made by dissolving two ounces of opium to the water used. Tobacco smoke is sometimes blown into the intestine through the stem of a pipe by way of the fundament. It is not of special value.

An enema for expelling worms from the large intestines is composed of two ounces of oil of turpentine in a pint of olive or of lard oil. Injections, either for relieving pain or for expelling worms, are not generally satisfactory, and their utility is doubtful.

SECTION IV.—DEODORIZERS AND DISINFECTION.

There is nothing more important during the prevalence of contagious diseases than disinfection to cause chemical disorganization of the germs of disease present. Deodorizers take up and eliminate noxious smells. Disinfectants destroy germs of disease. To destroy noxious odors in sinks, drains, stables, etc., a large handful of sulphate of iron (copperas) dissolved in a bucket of water, is cheap and efficient. One more effective, is an ounce of chloride of zinc, dissolved, to each four to six quarts of water used. Sawdust, pulverized dry clay, powdered charcoal, gypsum, copperas (sulphate of iron),

and permanganate of potassa are all well known and valuable, in the order named.

A cheap disinfectant and good deodorizer is made with

Copperas (sulphate of iron)	150 parts
Gypsum (ground)	75 parts
Carbolic acid	1 part

Mix well together.

A good disinfectant for stables that may be closed tight, is the fumes of sulphur burned on live coals.

Mix this with tar into balls the size of an orange, and place where needed.

For disinfecting stables, use:

Dry chloride of lime, 2 parts.

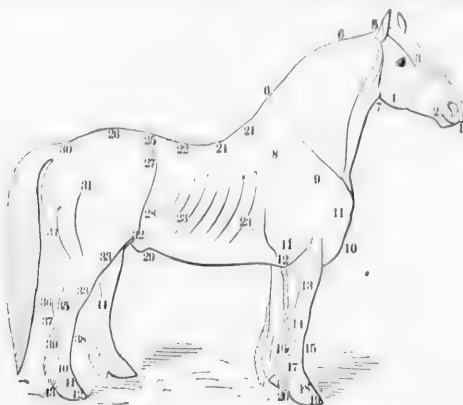
Burnt alum, pulverized, 1 part.

A powerful disinfectant for the same purpose is made by taking:

Common salt, 2 pounds.

Oil of vitriol, 1 pint.

Pour the oil of vitriol slowly, as it may be taken



ILLUSTRATING PARTS OR POINTS OF THE HORSE.

- | | | | |
|-----------------------|-------------------------------|-----------------------|-------------------------------|
| 1. Muzzle. | 12. Elbow. | 33. Ribs. | 34. The quarters. |
| 2. Nostril. | 13. Forearm. | 34-34. Girth. | 35. The hock. |
| 3. Forehead. | 14. Knee. | 35. Loins. | 36. Point of the hock. |
| 4. Jaw. | 15. Cannon bone. | 36. Croup. | 37. Where the curbs form. |
| 5. Poll. | 16. Hack shew. | 37. Hip. | 38. Cannon bone. |
| 6. Crest. | 17. Fetlock or pastern joint. | 38. Flank. | 39. Back shew. |
| 7. Windpipe. | 18. Coronet. | 39. The sheath. | 40. Fetlock or pastern joint. |
| 8. Shoulder blade. | 19. Hoof. | 40. Root of the tail. | 41. Coronet. |
| 9. Point of shoulder. | 20. Heel. | 41. Hip joint. | 42. Hoof. |
| 10. Breast. | 21. Withers. | 42. Stifle joint. | 43. Heel. |
| 11. Arm. | 22. Back. | 43. Lower thigh. | 44. Where spavin occurs. |

If the animals are to be fumigated, take:

Flowers of sulphur, $\frac{1}{2}$ pound.

Pine tar, 1 quart.

Mix with tow, and burn (smoking) until the animals show signs of distress by slight coughing; then ventilate at once.

A disinfectant for cess pools, drains, sewers, etc., infected with contagious germs, may be made as follows:

Sulphate of iron, 2 parts.

Sulphate of zinc, 1 part.

White oak bark, dry, in powder, 1 part.

up on the salt. The result is muriatic acid, one of the most powerful of disinfectants.

CHAPTER XXII.

ANATOMY AND POINTS OF THE HORSE.

SECTION I.—THE POINTS OF THE HORSE.

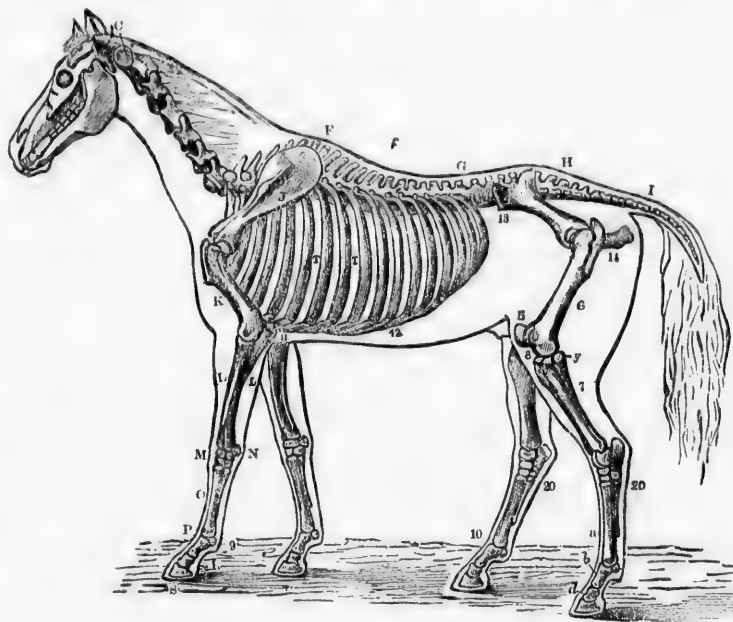
The technical terms used to designate the several parts or points of the horse, as seen upon a superficial observation, are fully shown by the illustration annexed.

Explanation of parts or points of horse in diagram.

SECTION II.—THE BONES AND THEIR PLACES.

The illustration of the skeleton and the names of the bones will fully answer our purpose. This will serve to show their position and importance in the animal economy. If the breeder wishes to make these matters a special study, and can spend the necessary time and money for special instructors and buy such text-books as may be necessary, well and

jointed processes respectively of the neck, back and tail. J is the scapula, or shoulder blade; K, Humerus, and S, shoulder joint; L, radius or bone of the arm; M, carpus or knee; N, trapezium; O, metacarpal bones, or bones of the leg; P, os sufraginis, or great pastern; R, os corone, or small pastern; S, os pedis, or coffin bone, the outline being the hoof outside the bone. T-T, the ribs.



THE FRAME WORK OR BONES AND OUTLINE OF THE HORSE.

good. It may not be time and money badly invested. Our idea here is simply to give a general idea, correctly illustrated, of the principal bones and their names in connection with the outline of the horse.

EXPLANATION OF BONES OF THE HORSE.

Commencing at the head, C shows the atlas; F the withers and below the dorsal vertebrae, the withers being formed by spinous processes of the anterior dorsal vertebrae; G, lumbar vertebrae; H, sacral vertebrae; I, carygeal vertebrae. These constitute the

Coming now to the figures, 4 shows the pelvis, consisting of three parts; 13, the ilium; 14, the ischium, and the pubis, hidden in the illustration; 5 is the patella; 6, the femur; 7, tibia; 8, stifle joint; 9, sesamoid bones; 10, fetlock joint; 11, ulna or point of elbow, and 12, the costal cartilages, or cartilages connecting the true ribs. The small letters show at a, the great metatarsal bones; b, the great pastern of the hind leg; d, the small pastern; f, the dorsal vertebrae, and y, the expansion of the tibia or leg bone.

SECTION III.—STRUCTURAL AND HISTORICAL POINTS.

The following is the basis of points for judging the qualifications of horses intended for breeding purposes to be submitted to the National Association of Trotting-Horse Breeders of the United States for amendment, modification and final action with a view to their adoption, as valuable in the breeding of road horses and horses intended for the other higher general uses. These embrace twelve structural and three historical points as stated in "Wallace's Monthly."

STRUCTURAL POINTS.

Head.—The size should be in proportion to the size of the animal. The form should be after the Arabian model, wide between the jaws, broad between the eyes, with prominent brain development; clean and bony, with lips neat and compressed, and nostrils active and delicate.

Eye and Ear.—Character is shown in these organs. Not only the size and fullness of the eye, but its expression must be considered. The ear should be active and thin, and generous in length.

Neck.—This point will include the setting on of the head, the length and shape of the neck, and the free development of the wind-pipe, especially at the throatle.

Shoulders and Forearms.—This point will include the slope and strength of the shoulders, the height of the withers, and the form and muscles of the forearms, both inside and out.

Barrel, Coupling and Croup.—This embraces the length, depth and roundness of the body, with the strength and spread of the loin, and the proper elevation of the croup.

Hips, Quarters, Stiles and Gaskins.—The symmetry of the hip, the breadth and strength of the quarters, the spread of the stiles, and the muscular development of the gaskins, inside and out, are to be considered in this point.

Hocks, Knees, Legs and Pasterns.—This point includes the strength and clean-cut articulation of all the members of the hock and knee joints; the angle of the hocks; the character and strength of the cannon bones, and the angle, elasticity and character of the pasterns.

Feet.—The general shape of the feet; their position when at rest; the width of the heels; the strength and healthy growth of the walls, as well as

evidences of internal troubles, will be embraced in this point.

Color.—According to public taste the leading colors may be classed as follows: Bay, dark chestnut, brown, black, roan gray. All white markings beyond a star, and one or two white feet, are objectionable.

Size.—This will be determined by the class to which this scale is applied. The model park horse is the model farm horse; and he should be sixteen hands, weighing twelve hundred pounds. The road and trotting horse not less than fifteen and a half hands.

Symmetry and Style.—This embraces the natural and unrestrained carriage of the head and tail, and the outline of form and figure, as presented in a state of animation.

Action Without Speed.—This will embrace the action and use of the limbs at the walk and at the slow trot, in which the difference between a dragging motion and the quick, trappy lifting of the feet will be considered. The right use of the knee and hock is a necessity.

HISTORICAL POINTS.

Pedigree.—This is the most important single point in the whole scale, and yet it is the one that has received the least attention. Consider well what the sire and dam each has inherited, what each has done as a performer, and what each has produced in the stud. Then consider the qualifications of the two grandsires and the two grandams in the same way. If the animal under judgment is running bred, consider the running qualifications of his ancestors, but if trotting-bred look only to the trotting qualifications. The value of a pedigree is the merit of the immediate crosses, viewed in the light of inheritance, performance and production.

Performance.—Ability to perform well compensates for a number of shortcomings in the inheritance. Nothing but technical "records" can be considered on this point. Any record is better than no record. Every animal intended to produce trotters should have his or her speed developed to some extent. The character and precision of the gait, with freedom from all artificial appliances, must enter into the value of this point.

Character of Offspring.—This point only applies to aged and tried sires and dams. The credits will be awarded according to the number and class of fast

performers from a given animal—the age and opportunities of competitors being considered.

CHAPTER XXIII.

BREEDING OF SOME FAMOUS HORSES.

SECTION I.—THE STUDY OF PEDIGREES.

The value of pedigree, the history, in fact, of an animal, showing its breeding for generations, consists solely in the fact that thus one may find from history what these animals had been, and in what their value consisted. The value of a horse as a sire must consist solely in his ability either to get animals capable of great muscular exertion in the several directions of running, trotting, speedy or slow draft, as the case may be. If to this is added style, good temper and strong constitutional health, the value is largely increased. Thus the study of a pedigree is intended to show the precise lines of blood from which the animal is descended. If to this the history of the sire, dam and their progenitors is known and studied it will assist greatly in forming an opinion. The structural and historical points thus both conduce to represent value in a sire. This is given in section III, chapter XXI.

The reading of the pedigree of Eclipse, for instance, shows that he was foaled in 1764, that his sire was Marske, and his dam Spiletta. The sire of Marske was Squirt, and his dam the daughter of Hutton's Blacklegs. The sire of Spiletta, the dam of Eclipse, was Regulus, and the dam of Spiletta was Mother Western. So the breeding may be traced directly back, step by step. In the stud books the record simply is given—the name of the sire and of the dam with their registered number, if there be one. Hence in studying a pedigree one must take the number of the sire and dam successively and construct the table for himself so far back as he wants to go. He must see how the lines mingle to produce the probability of continued goodness, and this can only be done by a careful examination of the history of the turf, if thoroughbred horses are in question, or the record of performances in other breeds, if draft, trotting, or the ability to pull a load at a fast pace is required.

SECTION II.—BREEDING OF FAMOUS RACERS.

The horses of to-day are without doubt the best that have ever existed. The English race horse has beaten the Arab at all distances on his native sands.

America has fairly contested the palm with England on the English turf and our horses have shown themselves the equals of the best English bred. French thoroughbreds have won often enough in England to stamp the breeding of their horses as among the best. The reason is obvious. We have bought the best English, proved, sires and dams and have bred for speed and stoutness combined.

The improvement in both England and America is for the reason that both English and American horses have been bred as closely together—consanguineously—as possible without weakening the constitution, and always in line. It is true, occasionally a phenomenon has been produced by out crossing, but always in the line of thoroughbred blood.

It would seem unnecessary to pursue the matter further in relation to racing stock. This class of horses does not interest the farmer specially. Their breeding is confined to a class of men who breed for the turf. Saddle horses, trotting and road horses, do, however, interest him personally. They are all good work horses and the better class bring high prices.

SADDLE HORSES.

If you wish to breed saddle horses get a stallion of the staunchest kind, strong, muscular, not too lengthy, but of good style, and of blood known more for their staying qualities than for great speed at short distances. If you get a horse whose blood is in the direction of ability to carry weight in soft ground his progeny ought to get good hunters. If he have style he will get saddle horses that will always sell for good prices in any market.

SECTION III.—BREEDING OF FAMOUS TROTTERS.

If you aspire to breed trotting horses you must have education of quite a different sort, and yet in the same line measurably as in that of running horses, since pedigree is of fully as much importance here as in that of running horses. Let us give some instances to show. We believe the blood of Messenger and Bellfounder possess about all the requisites necessary to ensure fast trotting. Messenger was certainly a thoroughbred. There is a question whether Bellfounder was. If not the stain in his pedigree is not serious. He was a great trotter for his day and is the progenitor of horses famous for style and speed. Messenger is the progenitor of horses famous both at running and trotting gaits. These two bloods certainly nick oftener than any

other. The blood of Messenger certainly does nick kindly with the Morgans, themselves undoubtedly with a large measure of thorough blood, and especially does the progeny of Messenger work kindly upon that of thoroughbred mares who have the trotting form; that is, strong muscular development and the power of great extension of limb with capacity to gather quickly from the stride. But to breed winners, one must know that both sire and dam have come of this class.

HAMBLETONIAN.

First let us look at the breeding of Hambletonian, and some of his progeny.

BREEDING OF HAMBLETONIAN.

Hambletonian (Rysdyk's), b. h., foaled 1849; by Abdallah, son of Mumbrino, he by imp. Messenger; dam the Chas. Kent Mare by imp. Bellfounder; 2d dam One Eye by Bishop's Hambletonian, son of imp. Messenger; 3d dam Silvertail by imp. Messenger. Sold with his dam when a weanling to Wm M. Rysdyk, Chester, Orange County, N. Y., where he remained until his death, March, 1876. Sire of

RECORD.	DAM.
Dexter, br. g. 2:17½	Clara by Seely's American Star.
Nettie, b. m. 2:18	by Seely's American Star.
Orange Girl, b. m. 2:20	Dolly Mills by Seely's American Star.
Gazelle, b. m. 2:21	Hattie Wood by Sayre's Harry Clay.
Jay Gould, b. h. 2:21½	Lady Sanford by Seely's American Star.
Bella, b. m. 2:22	Lacy McMann by Jupiter.
Geo. Wilkes, br. h. 2:22	Dolly Spanker by Henry Clay.
Deucalion, b. m. 2:22	Trusty by Young Trustee.
Mattie, b. m. 2:22½	Lacy Almack by Young Engineer.
Young Bruno, br. g. 2:23	Kate by Bellaire.
Lady Bunker, b. m. 2:23	said to be of Tippoo stock.
Madeline, b. m. 2:23½	Nancy Whitmore (dam of Robt. Mc-
Breeze, b. g. 2:24	by Seely's American Star.
James Howell, Jr., br. g. 2:24	Jessie Sayre by Sayre's Harry Clay.
Effie Deans, b. m. 2:25	Mollie by Long Island Black Hawk.
Ella Madden, b. m. 2:25½	by Drew's Hambletonian.
Small Hopes, br. g. 2:26½	unknown.
Chester, br. g. 2:27	Julia Machree by Seely's American Star.
Jerome, b. g. 2:27	Fanny Fisk by Young Almack.
Lottery, br. g. 2:27	Jane Murray, pedigree unknown.
Kisbur, b. h. 2:27½	Lady Fallis by Seely's American Star.
Shark, b. g. 2:27½	the McKinstry mare.
Lottie Emma E., b. m. 2:28	Mollie by Long Island Black Hawk.
Scotland Maid, b. m. 2:28½	Trusty by Young Trustee.
Alma, br. m. 2:28½	Clara by Seely's American Star.
Enfield, b. h. 2:29	Julia Machree by Seely's American Star.
Marguerite, b. m. 2:29	Kate Smith by Abdallah.
Factory Girl, b. m. 2:29½	by Green's Holtzar.
Administrator, b. h. 2:29½	by Mumbrino Chief.
Astoria, b. m. 2:29½	Clara, dam of Dexter, by Seely's American Star.
Bruno, br. g. 2:29½	Kate by Bellaire.
Hamperion, b. h. 2:29½	pedigree not traced.
Harvest Queen, b. m. 2:29½	by Seely's American Star.
Drift (Norwood), b. h. 2:29½	Fannie Nutwood by Saltram.
Maid, b. m. 2:29½	Starlight by Seely's American Star.
Sentinel, b. h. 2:29½	Lady Patriot by Young Trustee.
Lady Augusta, b. m. 2:30	by Saltram (pacer.)

It will be seen that he is strong both in Messenger and Bellfounder blood.

BELLFOUNDER'S BREEDING.

Let us now look at Milliman's Bellfounder. His breeding is as follows:

Bellfounder (Milliman's), b. h., foaled 1850; by Bellfounder, son of the Morso Horse; dam by Engineer 2d, son of Engineer, he by imp. Messenger; 2d dam by Harris' Hambletonian, son of Bishop's Hambletonian, he by imp. Messenger. Sire of

RECORD.	DAM.
Dexter br. h. 2:21½	by Sumpter.
Gus Guerra, b. h. 2:21½	Jenny Noyes.
Nellie Burns, b. m. 2:22	unknown.
Bellflower, b. m. 2:24½	unknown.
Sweet Home, ch. m. 2:30	

The value of a trotting horse, like any other property, is what he is worth to sell. Let us examine some interesting facts relating to the Hambletonian family in relation to their money value. We quote from the *Turf, Field and Farm*, where we find the matter in condensed shape:

"The stallion himself (Hambletonian) was purchased with his dam for \$125, and earned in stud fees \$205,750. Thirty-six of his get have trotted in 2:30 or better, and the prices for which they were or could have been sold for in their best days are as follows: Dexter, \$85,000; Jay Gould, \$30,000; Nettie, \$25,000; George Wilkes, \$25,000; Gazelle, \$20,000; Bella, \$15,000; Mattie, \$16,000; Bruno, \$15,000; Deucalion, \$10,000; Enfield, \$10,000; Orange Girl, \$10,000; Sentinel, \$10,000; James Howell, Jr., \$10,000; Harvest Queen, \$8,000; Young Bruno, \$8,000; Kisbur, \$7,000; Madeline, \$6,000; Breeze, \$6,000; Administrator, \$5,000; Draft, \$5,000; Effie Deans, \$4,000; Ella Madden, \$4,000; Lottery, \$4,000; Lottie, \$4,000; Scotland Maid, \$4,000; Chester, \$3,500; Hamperion, \$3,500; Factory Girl, \$3,000; Jerome, \$3,000; Mand, \$3,000; Alma, \$2,500; Astoria, \$2,500; Lady Augusta, \$2,500; Marguerite, \$2,500. This is a total of \$335,000, as a fair estimate of the actual cash value."

The stallions in the list which have won renown in the stud are Sentinel, George Wilkes, Jay Gould and Administrator. Their united progeny is worth a great many thousand dollars. George Wilkes, for instance, is the sire of twenty-six 2:30 trotters, including Wilson, 2:16½; Rosa Wilkes, 2:18½; Joe Bunker, 2:19½; So-So, 2:17½; and May Bird, 2:21. Sentinel has eight 2:30 performers to his credit, among them Von Arnim, 2:19½.

The fastest of Jay Gould's get is Adele Gould, 2:19, and the best one from the loins of Administrator is Catchfly, 2:19. The entire sons of Hambletonian which have no place in the 2:30 circle, but which have been successful in the stud, are very numerous.

Alexander's Abdallah was sold for about \$3,500, but he got Goldsmith Maid, who made a record of 2:14, and whose turf winnings foot up close to \$250,000; Thorndale, who gained a record of 2:22½, and from whose loins came Edwin Thorne, 2:16½, and Daisydale, 2:19½; Almont, the sire of twenty-two 2:30 trotters, including Fanny Witherspoon, 2:17; Piedmont, 2:17½; and Aldine, 2:19½; and Belmont, with nine sons and daughters with records of better than 2:30, among them Nutwood, 2:18½, and Wedgewood, 2:19. The descendants of Alexander's Abdallah are worth hundreds of thousands of dollars.

Volunteer stands in the very front rank of the producing sons of Hambletonian. He has to his credit twenty-three 2:30 performers, one of which is St. Julien, 2:11½, who at one time could have been sold for \$40,000. When Messenger Duroc's stud fee was \$300, Mr. Backman refused a very large sum for the stallion, and he would not sell Leland for \$20,000. The price paid for Happy Medium, when he was sold to Mr. Steel, was \$25,000; and Mr. Donner paid \$20,000 for Startle, sire of Majolica, 2:17.

Electioneer proved a very cheap horse to Governor Stanford, who gave Mr. Backman \$12,500 for him. He is the sire of the fastest yearling, 2:36½; the fastest two-year-old, 2:21; the fastest three-year-old, 2:19½, and the fastest four-year-old, 2:18½; and \$30,000 would not buy him now. Dictator is the sire of the three sensational performers of 1883—Jay-Eye-See, 2:10½; Phallas, 2:15½, and Director, 2:17—and when twenty years old he was sold for \$25,000.

Harold, sire of Maud S., 2:09½, is valued 'way up in the thousands at Woodburn, and so is Cuyler at Glenview. General Withers paid \$5,000 for Aberdeen when he took him to Fairlawn, but this was nothing like his value. Prominent among his ten 2:30 performers are Hattie Woodward, 2:15½, and Modoc, 2:19½. The progeny of Edward Everett, Middletown, Walkill Chief, Dean Sage, Knickerbocker, Seneca Chief, Strathmore and Rysdyk (sire Clingstone, 2:14) are worth a stack of money.

BLUE BULL.

Let us now look at the record of the produce of another great stallion. It is as follows:

Blue Bull (Wilson's), ch. h., foaled 1858; by Pruden's Blue Bull, son of Merring's Blue Bull; dam unknown. Dead. Sire of—

RECORD.	DAM.
Will Cody, b. g. 2:19½	Cella, a grey mare of unknown blood.
Silver-on, b. g. 2:20¼	Silverella, said to be by Pilot Jr., the dam of Milla C., 2:20½.
Zoe B., b. m. 2:20	by Pete Griffin
Chance, ch. g. 2:20½	by Sir Leslie.
Richard, ch. g. 2:21	Silveretta, dam of Silverton.
Mamie, b. m. 2:21¼	by Alexander's Abdallah.
Elsie Good, ch. m. 2:22½	by Jim Monroe.
Dictator, b. g. 2:22½	by Brown's Tom Crowder.
Ethel, gr. m. 2:23	the dam of Maudie H., 2:29½.
Kate McCall, gr. m. 2:23	by Davy Crockett.
Belle Wilson, ch. m. 2:23½	
Lona Giffin, b. m. 2:23½	
Ira G., b. m. 2:24	
Kate Hall, b. m. 2:24½	Nellie 2d by Young Proud America.
Florence M., ch. m. 2:25½	unknown.
Russell, ch. m. 2:26	by Tom Hal.
Blanche H., blk. m. 2:26½	
Commander, b. h. 2:26½	the dam of Zoe B., 2:20½.
Milla C., ch. m. 2:26½	by Brown's Tom Crowder.
Bertha, gr. m. 2:27	unknown.
Dom Pedro, b. g. 2:27	
Doctor Frank, ch. g. 2:27½	unknown.
Mollie Kessler, b. m. 2:27½	by General Taylor.
General Russell, ch. m. 2:29¼	(the dam of Kate McCall, 2:23)
Kate Bennett, ch. m. 2:29½	by Davy Crockett.
Mattie H., b. m. 2:29½	
Ed. Wilder, ch. g. 2:30	Fanny Benson by Jerry.
Ella Wilson, b. m. 2:30	Folly by Sovereign Genecoe.
Little Wonder, ch. h. 2:30	
May Hunt, b. m. 2:30	Susan Loder by Daniel Boone.
Parity, ch. m. 2:30	by the Pearsall Horse.
James Halfpenny, b. g. 2:30	

One more, that of Dictator, the sire of the now famous Jay-Eye-See, whose record is already 2:10, who has forced Maud S. to a record of 2:09½, and who, when he gets age enough, may become the fastest horse who ever trod the trotting turf.

Dictator, br. h., foaled 1863; by Rysdyk's Hambletonian, son of Abdallah; dam Clara (dam of Dexter 2:17½) by Seely's American Star; 2d dam the McKinstry Mare (dam of Shark 2:27½). Sire of

RECORD.	DAM.
Jay-Eye-See, blk. g. 2:10	Midnight by Pilot Jr.
Phallas, b. h. 2:15½	Betsey Trotwood by Clark Chief.
Director, blk. h. 2:17	Dolly by Mambrino Chief.
Cody, b. h. 2:20½	Crop by Pilot Jr.
Donald, b. g. 2:27	the Birch Mare by Brown Pilot.
Annie G., b. m. 2:28	Annie Laura by Harris' Hambletonian.
Princess, blk. m. 2:29¼	

SOME TROTTERS IN 2:20 OR BETTER.

The dams of the horses that have trotted in 2:20 or better and which may be taken as authentic, are as follows: Jay-Eye-See has trotted in 2:10, and Maud S. in 2:09½, thus reducing the record as given. How fast either of these animals may yet go, as well as some others in the list, remains to be seen. We

give the figures as we receive them. It shows that nearly half the animals in the list were direct descendants in the male line of Rysdyk's Hambletonian, and that the others, with so few exceptions as to be scarcely noticeable, came from some recognized trotting family. Of the 119 horses that are included in the 2:20 list, it is said none were sired by a thoroughbred stallion. Again, of the 119 horses in the 2:20 list, the sires of the dams of no less than twenty-seven are unknown, leaving ninety-two to be accounted for. The dams of twenty-nine of these were sired by ten horses, as follows—the number to the credit of each and the fastest record made by produce being also given:

NAME.	NO.	RECORD.
Sayre's Harry Clay	3	2:11½
Seely's American Star	3	2:17½
Pilot Jr.	1	2:10½
Clark Chief	1	2:14½
Rysdyk's Hambletonian	2	2:14
Henry Clay	2	2:15½
Mambrino Chief	2	2:17
Mambrino Chorister	2	2:18
Mambrino Patchen	2	2:18½
Scott's Hiatoga	2	2:18¾

Sayre's Harry Clay, who has five in the list, the most notable one being Flora (the dam of St. Julien, Umdala and St. Remo, all in the 2:30 list), was foaled in 1853, and is still alive. His sire was Neave's Cassius M. Clay Jr., a son of Cassius M. Clay, and his dam was by imp. Bellfounder; further than this his breeding is unknown. The only other known element in the pedigree of Sayre's Henry Clay is the blood of Bellfounder, a horse whose progeny, when distinguished at all, were made prominent by their capacity to trot fast and go a long distance.

Seely's American Star, who stands on equal terms with Henry Clay in the number of his daughters who have been the dams of 2:20 trotters, sired the dam of Dexter.

Pilot Jr., although having but four daughters in the list, is the sire of daughters who produced Maud S., 2:0½, and Jay-Eye-See, 2:10, the fastest trotters by the record that have ever worn harness. Pilot Jr. was of pacing origin, his sire being Pacing Pilot, a horse of unknown blood, but he got trotters that were among the best of their day. John Morgan 2:24; Pilot Temple, 2:24½; Tackey, 2:26; Tattler, 2:26; Queen of the West, 2:26½; General Sherman, 2:28½; and Dixie, 2:30, being to his credit.

Clark Chief, son of Mambrino Chief, sired three mares that were the dams of horses in the 2:20 list;

they being Betsey Trotwood, dam of Phallas, 2:15½; Miss Coons, dam of Wilson, 2:16½; and Jessie Kirk, dam of Majolica, 2:17—a grand showing for a horse that died at the age of ten, and was in the stud only seven seasons, leaving, besides the mares mentioned, six to his credit in the 2:30 list.

The horses that have each sired two mares that produced 2:20 trotters are Rysdyk's Hambletonian, Henry Clay, Mambrino Chief, Mambrino Chorister, Mambrino Patchen and Scott's Hiatoga. The last named horse was of pacing blood on all sides, being by Hanley's Hiatoga, dam by Blind Tuckahoe, and he has half a dozen sons and daughters in the 2:30 list. All these horses, save Scott's Hiatoga, it will be noticed, are members of recognized trotting families. Is not that why their daughters, when bred to trotting stallions, produce so many trotters and such fast ones?

SECTION IV.—IN-BRED, OUT-BRED AND LINE BREEDING.

In-breeding is the breeding together of animals closely related—that is, within the relationship of second consins. Out-breeding, or out-crossing is the pairing of animals not allied at all. Between these extremes there are many degrees. Line breeding is the union of animals of a distinctive family or of those having a common foundation, and without a violent out-cross on either side. In cattle line breeding is carried to a great extent, as the breeding of duchess constantly on duchesses, princess on princesses, etc. In the breeding of horses line breeding is not so exactly followed, though in the breeding of trotters results are now being sought in this direction. Line breeding really is but another name for in-breeding, or rather as distinguished from close in-and-in-breeding. As to a comparison of the advantages of either system, the whole matter has been so carefully discussed by Stonehenge that we quote from him. At the time he wrote the in-breeding of horses made good hits. The lines of blood are now so diverse that there is a wide field of the blood of running horses to choose from. Upon this plan of breeding we extract from Stonehenge to form a synopsis:

IN-BREEDING.

"Let one ask what horses have been the most remarkable of late years as stallions, and, with very few exceptions, he will find they were considerably in-bred. It has been remarked that the Touchstone and Defence blood almost always hits with the

Selim; but it is forgotten that the one was already crossed with that horse, and the other with his brother Rubens. On the other hand, the Whisker blood in the Colonel has not succeeded so well, it being made up of much crossed and more distantly related particles, and therefore not hitting with the Selim and Castrel blood, like his cousins, Touchstone and Defence. It has, however, partially succeeded when in-bred to the Waxy and Buzzard blood, as in Chatham and Fugleman, who both reunite these three strains. The same applies to Coronation, who unites the Whalebone blood in Sir Hercules with that of Rubens in Ruby; but as Waxy and Buzzard, the respective ancestors of all these horses, were both grandsons of Herod, and great-grandsons of Snap, it only strengthens the argument in favor of in-breeding. This conclusion is in accordance with axioms which embody the state of our present knowledge of the theory of generation. Purity of blood is intimately connected with the practice, because the nearer it is to one standard, the more unmixed it is, and by consequence the more fully it is represented in the produce. Hence, it is doubly needful to take care that this pure blood is of a good kind; because if bad, it will perpetuate its bad qualities just as closely as it would the good, or perhaps still more so."

OUT-CROSSING.

Between in-and-in-breeding and out-crossing there are many degrees; but as, in the thoroughbred horse, there are scarcely two in the stud-book which cannot be traced back to the same stock in one or more lines, we do not generally understand "a cross" to demand absolute distinctness of blood. For instance, says Stonehenge, Teddington is generally considered as the result of as marked a cross as we ever meet with in the modern stud-book. For five generations the same name never appears in the pedigree tables of his sire and dam; but in the sixth we find the name of Sir Peter occur three times on the side of his sire, and twice on that of his dam, besides six other lines of Herod blood on the part of the sire, and eight on that of the dam. Here, therefore, there was a return to the original lines of blood, which had been in-bred twice each, after five successive departures from them as far as could be effected in this particular kind of horse. These last are called "crosses," though not being

exactly the reverse of in-breeding, for the reason that an absolute freedom from relationship is not to be found, or, if so, extremely rarely. Breeders very often fancy that they put two animals together which are without any corresponding lines or strains of blood in their composition; whereas, in point of fact, the relationship exists only four or five degrees off. The horse and mare are, perhaps, fourth or fifth consins, often second or third; but, in examining the stud-book, the blood of the sire, grandsire, and great-grandsire is apt to be forgotten, because it is not given, the name only being mentioned.

To illustrate we give the pedigree of one of the later stallions of trotting blood, taken at random, not only to show the manner in which pedigrees are tabulated for special use, with foot notes relating to any fact worthy of notice, but also to show the reading of pedigrees, etc.

ALMONT BRUNSWICK.	Affiliation.	Almont Chief (2:40)	{ Alexander's Abdallah.
		{ Duke of Brunswick (2:40)	{ Almont { Mambriño Chief
		{ Madam Loomer { dam of Dick Loomer, 2:31 3/4	{ Daughter of { Mambriño Chief
			{ Monogram, by Mambriño Chief.
Mambriño Beauty.	Beauty.	Mambrino Patchen {	Rysdyk's Hambletonian.
			{ Warrior, by Young Messenger, by
			{ Winthrop Messenger, by imp. Messenger.
			{ An English Mare of high breeding and form.
Mambriño Beauty.	Beauty.	Mambrino Patchen {	{ Mambriño Chief.
			{ Dam of Lady Thorne { Gano, etc.
			{ Imp. Consternation.
			{ Daughter { American Eclipse, etc.

NOTE:—Bay coat, star, black points, heavy tail and mane, color deep red bay, full of bone and substance, sound, level headed, even tempered, 16 hands and over, foaled May 31, 1891. 25 per cent Mambriño Chief, 18 3/4 per cent Hambletonian, 3 1/2 per cent Pilot, Jr.

To follow this or any other pedigree for blood lines look in the appropriate stud book register, etc., for pedigree of sire, dam, grandsire, granddam, etc., etc., as far back as may be necessary. These may then be carried out on a chart for reference.

SUMMING UP.

In relation to the advantages and disadvantages of each plan our authority says: In the first place, it may be laid down that nearly an equal number of good horses have lately been bred by adopting either mode of proceeding; but no first-rate horse has appeared whose parents were incestuously allied. In the second place, it may be gathered from experiments with horses and other domestic animals, that very close in-breeding, continued for any length of time, is apt to develop the weak

points in the constitutions of the breed in which it is adopted. The cautious breeder, therefore, will do well to avoid running this risk, and will strive to obtain what he wants without having recourse to the practice, though, at the same time, he will make up his mind that it is unwise to sacrifice a single point with this view. Experience tells us that it is useless to expect to develop a new property or quality in the next generation, by putting a female entirely deprived of it to a male which possesses it even in a marked degree. Some instances of success will attend the adoption of this course, but as a rule it cannot be relied on in the majority of instances. Thus, a slow, stout mare, containing no lines of fast blood in her pedigree, will not be likely to breed a fast colt, though put to a flying stallion, whose blood is not stout in a considerable proportion of his ancestry. Two or three consecutive crosses with the same or similar blood will almost of a surety effect the object; but the first will rarely do so. Again, we know, if we put two animals together, equally in-bred or equally crossed, the produce is, on the whole, as likely to resemble the one parent as the other, though there may be a difference of opinion as to particular points. But, if not thus equally composed of similar elements, the more in-bred parent will be represented in a greater proportion than the crossed one; and hence it follows, that if it is desired to keep up the qualities of the horse or mare in his or her descendant, the mate must be selected, if possible, less in-bred than he or she is.

WHAT IS A NICK?

A "hit," or "nick," in breeding is understood to mean an instance of success; but though it often occurs the reason for it is not always very clear. It is a fact (so patent that every writer on the breeding of the horse, of late years, has admitted its truth), that the Touchstone and Sultan blood have almost invariably hit. The reason, granting the premises laid down, is plain enough—each goes back to Selim, the former through the dam of his sire, Camel, and the latter being son of that horse. Many other examples of a similar nature might be adduced, though not observed so extensively as in the case of Touchstone, because few horses have been put to so many mares as he has. I do not mean to assert that no hit can occur without such a re-union of previously separated lines, but I believe that, under other circumstances, it will rarely be found to show

itself; and if there is a relationship between all thoroughbred horses, either remote or near, there must be this re-union to some extent. This, however, is not what I mean; the return must be to a line only removed two, three, or four generations, in order to be at all marked; and if more than these intervals exist, the hit cannot be said to depend upon the re-union, since this must occur in all cases; and what is common to all cannot be instanced as a particular cause of any subsequent result. [It must be remembered, however, that this was written nearly a quarter of a century ago; nevertheless, the facts are received to-day as essentially correct. In short, that blood lines must be closely followed to ensure the best measure of success.]

The fact really is, concludes Stonehenge, as proved by thousands of examples, that by putting A and B together, the produce is not necessarily made up of half of each. Both parents have qualities belonging to the several members of a long line of ancestors, and their son (or daughter) may possibly be made up of as many as seven proportions of one parent and one proportion of the other. It generally happens that if there is any considerable degree of consanguinity, or even a great resemblance in form, to some of the ancestry on each side, the produce will draw together those elements, and will be made up of the characteristics peculiar to them in a very large proportion. This accounts for the preponderance of the Touchstone form in the West Australian stock; while the same horse is overpowered in Orlando and his stock, by the greater infusion of Selim blood in the dam Vulture, who is removed exactly in the same degree as Touchstone from Selim and his brother Castrel; and the two latter, therefore, have no more influence on the stock than the former. Here, then, we have two remarkable instances, which each show a hit from the re-union of strains after two out-crosses; while, at the same time, they severally display an example of two lines overpowering one in the stock of the same horse. It may be argued, that in each case it is the blood of the dam which has overpowered that of the sire,—West Australian being by Melbourne, out of a daughter of Touchstone; while Orlando is by Touchstone, out of a mare descended from two lines of Selim and his brother Castrel. Now, I am myself a great believer in the influence of the dam over her progeny, and therefore I should be ready to

accept this argument, were it not that, under ordinary circumstances, both Melbourne and Touchstone have been sure to reproduce their likenesses in their several sons and daughters. Every racing man who has been on the turf while the Melbournes and Touchstones were in their glory, was able, in almost all instances, to say at the first glance, "That is a Melbourne or a Touchstone colt or filly." But, in the cases of Orlando and West Australian, the resemblance to their respective sires was not apparent; and, as I before observed, it is still less visible in their stock. In the language of the stud, this is called "going back" to a particular strain; and it is so constantly observable that there is no necessity for dwelling further upon it.

SECTION V.—CONSANGUINITY.

As an illustration of how *consanguineous* marriages take place in certain localities in the human family, and which will be most interesting, for the reason that it points a moral in breeding and has an equine mixed up with it, the following, from the Nantucket correspondence of the New York *Herald*, will be appropriate:

"The family nomenclature of the island always causes remarks by the visitors who make a protracted stay. Less than a dozen names are included in the list of the original settlers, and nearly half of them are no longer heard on the island. Others came afterward from the mainland and swelled the number of early family names to perhaps fifteen. Their descendants multiplied to such an extent that double Christian names were a matter of necessity to avoid confusion, and in many cases it is found necessary in speaking of a person to include every appellation lest he be confounded with another who shares in part the same name. Thus we hear of Charles Frederick Coffin and George Wendall Macy to distinguish them from some other Charles Coffin or George Macy, and the words 'junior' and 'second,' and 'third,' and even 'fourth' must sometimes be added to the surname to insure identity. Still others, who have no middle name, are sometimes identified by the locality of their residence. One Joseph Fisher was known as 'Madequet Joe,' and a Charles Coffin was called 'Pocomo Charles,' that they might not be confounded with others. These original families have married and intermarried until nearly every man, woman and child descended from the early settlers is related to each other; and it may well be be-

lieved that kinship here is a good deal mixed. That veritable ancient mariner, Capt. William Baxter, now in his 80th year, is the recognized oracle in matters of genealogy and family relationships on the island; and he it is who is my authority for the statement that there are men on the island who can be shown to be their own grand-uncles! He says he knows of children who are the second cousins of their own mothers! Furthermore, he has pointed out to me more than one man who was both a brother-in-law and grand-nephew of his third cousin. And, to cap the climax, he said that he once called at a house at which a tea party was under full headway, and of eight ladies present five were both first and second cousins and sisters-in-law of one another; and yet to this day the mind of not one of them has been so far affected in the successful effort to trace out the sinuosities of the relationships that it has been found necessary to send her to a lunatic asylum. And the Captain told me that if I doubted the story he could show me the cover of the identical tea-pot in which the inspiring beverage was drawn on the memorable afternoon. With a demonstration so convincing I need not say that 'I tumbled to the racket.'

"But a still more remarkable coincidence has come to my knowledge. On the eve of the fourth of July, some years since, the eldest boy of John Asa Fisher 2d exploded a fire cracker under the mare of Peter Starbuck Jr. as she was standing hitched to a box-wagon on the corner of Whale and Main streets. The mare did not appreciate the act as an ebullition of youthful patriotism. To her equine understanding it was intended as a joke on herself, and that she did not appreciate the joke was manifest by the fact that she ran away, broke the wagon into ultimate smithereens and knocked down and ran over Jonathan David Myrick. The injured man was carried into the store of Ebenezer Paddock 4th. Obed Gardner 8d ran for Dr. Pitman, who came at once, but the man was so much injured that, in spite of surgical aid, he died in a few minutes. 'Squire Coffin held an inquest on the body. Frederick William Folger made the coffin. Elder Macy preached the funeral sermon. Roland Bunker Hussey wrote and published an obituary in the *Inquirer and Mirror*. Jabez Chase 2d dug the grave, and Washington Irving Coleman furnished the headstone, and an orthodox Quaker who never draws on his imagination at less than ten days' sight, told me that every one I have

named, including himself, was in the degree of fourth cousin to every one except the mare, and how it happened that she couldn't claim kinship to the rest was a question which confused the island for over six months, for the mare was a native and had a pedigree as long as the bow that Mr. Swain had drawn for my edification." Thus it would seem that there is some pretty close in-breeding in the human family, outside the grandees of Spain, and without physical degeneration. Why not then in animals?

CHAPTER XXIV.

DICTIONARY OF HORSEMEN'S TERMS IN COMMON USE.

SECTION I.—TERMS IN USE BY HORSEMEN AND THEIR EXPLANATION.

Bars.—Those portions of the crust or hoof of horses that are reflected inward, and form the arches situated between the heels and the frog.

Bars of the mouth.—The fleshy rows that run across the upper part of the mouth, and reach almost to the palate. They form that part of the mouth on which the bit should rest, and have its effect.

Bar-shoe.—A particular kind of shoe sometimes used to protect a tender frog from injury, the hinder part of the shoe being thickened and hollowed over the frog.

Bishoping.—A term used to denote altering the shape and appearance of the teeth of the horse to make them seem younger than they are—so named from the scoundrel who invented it.

Blemish.—Any imperfection in a horse or other animal. In horses, blemishes consist of broken knees, loss of hair in the cutting places, mallenders and sullenders, cracked heels, false quarters, splints, or excrescences which do not occasion lameness, and wind galls and bog spavins, where they prevail to any great degree.

Bone spavin.—A disease of the hock joint in horses, brought on by over exertion. While forming there is continued lameness. Spavined horses are useful for slow work; they are most inconvenienced in the act of rising.

Bottom.—The quality of endurance in a horse.

Bound.—A term applied to the bowels, to indicate want of natural action; to the skin or hoof, to indicate tightness or constriction.

Breaking.—The training of horses and other animals. It should not commence too young, or they

want spirit; or too late, or they become unmanageable.

Breastplate.—A strap running across the chest of the horse, to hold the saddle tight.

Breeching, or breechin.—That part of the horse's harness attached to the saddle, and hooked to the shafts, which enables him to push back the vehicle to which he is harnessed.

Breeding.—As applied to live stock it denotes the manner in which an animal is bred, as lines of ancestry, etc.

Bridle.—The covering to the head of a horse by means of which he is driven. The several parts of a bridle are the bit, or snaffle; the head-stall, or leather from the top of the head to the rings of the bit; the fillet, over the forehead and under the fore-top; the throat-band, which buckles from the head-band under the throat; the nose-bands, going through the loops at the back of the head stall, and buckled under the cheeks; the reins (strips of leather) that come from the rings of the bit, and held in the rider's hands.

Breeding in-and-in.—Denoting the breeding to close lines of relationship but not necessarily incestuously so.

Broken-kneed.—Scars left from injury to the knees in falling.

Broken-winded.—Denoting the peculiar motion in breathing, and the accompanying noise, the result of injury to the respiratory organs.

Calks, or calkings.—The parts of a shoe turned to give grip to the shoe in pulling loads, or in traveling on slippery places.

Canter.—An artificial slow gallop in which the haunches are carried very much under the animal; considered elegant, but excessively fatiguing.

Clefts.—Cracks in the heels of horses.

Colt.—The male young of the horse, ass or their hybrids up to the age of three or four years.

Enamel.—The hard, ivory-like portion of the teeth.

Excrescence.—Any unnatural growth, tumor or callous.

Filly.—Young mare up to the age of three or four years.

Fleam.—The blade used in bleeding animals.

Flexors.—The muscles by which the limbs are bent or moved.

FOAL.—The young, of either sex, of the horse, ass or their hybrids, and of the genus *equus* generally.

FOALING.—To be delivered of a foal.

FROG OF THE HORSE.—A triangular portion of horn projecting from the sole almost on a level with the crust, and defending a soft and elastic substance called the sensible frog. The sensible frog occupies the whole of the back part of the foot, above the horny frog and between the cartilages.

GALLS.—As applied to animals' wounds produced by the friction of harness. The little tumors formed under saddles are called warbles. (See Wind-galls).

GRINDERS.—The molar teeth, placed next behind the incisors.

GULLET.—The esophagus or swallow of an animal.

HIDEBOUND.—A condition of the skin of animals when it seems to adhere to their bones. It is usually the result of a want of care, or a symptom of disease.

HOOF.—The solid horny covering (nail) of the foot of the horse. Its composition is similar to that of horn. Horn is indurated skin consisting principally of modified albumen. It resembles hair in its chemical qualities.

INSTEP OF THE HORSE.—The part of the hind leg reaching from the ham to the pastern joint.

MULE.—In horsemen's language offspring of the ass and the mare, or of the she ass and the horse. In the latter case the produce is called a jennet, and is much less hardy, and therefore rarely bred. The term mule is generally applied, in the animal creation, in the same sense with hybrid in the vegetable world, signifying the intermixture of two distinct species of a genus.

INCISORS.—The sharp cutting or nipping teeth placed in front of the mouth of animals. They are sometimes called nippers.

NOSE-BAG.—A bag containing food to be tied to the horse's nose.

NOSE-BAND.—That part of the headstall of a bridle which passes over the nose, sometimes called maserole.

PASTERN.—The distance that intervenes between the joint of that name and the coronet of the hoof.

POINTS OF A HORSE.—External indications showing aptitude for speed, bottom, labor and general characteristics of strength.

RIIDLING.—A male animal half castrated. The gelding of ridglings must be performed by one under-

standing the anatomy of the parts, since one or both testicles are situated in the cavity of the belly.

RING BONE.—A callous growing in the hollow circle of the little pastern of a horse, just above the coronet.

SAND CRACKS.—Fissures in the hoofs of horses from which matter exudes.

SPLINT.—A hard excrescence growing on the shank bones of horses. It appears first in the form of a callous tumor, and afterward ossifies. Also a mechanical arrangement to sustain a broken limb.

STRAINS AND SPRAINS.—Injuries produced by overstretching of the ligaments or muscles.

WHIRLBONE.—In the horse the articulation (*acetabulum*) of the thigh bone and pelvis.

WIND GALLS.—Small tumors near the fetlocks of horses, produced by strains and over-driving; they contain a serous fluid.

WITHERS.—The high portions of the back of the horse, over the shoulders. They assist to render the horses active and safe on their feet.

YEARLING.—A colt or filly between the age of one and two years. In racing the age of an animal is dated from a fixed day in the year (January 1). Hence the time of foaling is an important integer in animals required to carry weights on the turf.

SECTION II.—GLOSSARY OF TERMS IN USE ON THE TURF AND THEIR DEFINITIONS.

ADDED TO THE LIST.—A turf stallion gelded.

AGED HORSES.—Running horses past six years of age.

BEEFY.—A soft horse; a horse carrying too much flesh; not trained down.

BARNEY.—A race where there has been a "cross" or "sell-out."

BARRED.—When a horse is prohibited from running or trotting in a certain class or entering for any special purse.

BEAT OUT.—Beaten by a distance or from the start.

BOLT.—Giving up the race by running to one side.

BOOTS.—Leather or canvas to protect the ankles or knees.

BREAK.—To change to a run or skip in trotting.

BROKE DOWN.—When the back tendons give way the horse is said to be broken down.

BRUSH.—A short contest on the road or track.

BY A THROATLATCH.—When a horse wins by a head he is also said to have won by a throatlatch.

COLT.—Usually applied to a stallion or gelding until he has completed his fourth year.

COLLAR.—To draw up on an antagonist.

COLORS.—The caps or costumes worn by jockeys or drivers to distinguish one from another.

COMBINATION.—A pool formed by jockeys or drivers to fix an event.

CONFEDERACY.—An association of a number of owners of race-horses.

CONVERT.—To change a horse's gait, such as a pacer to a trotter; a term used by trainers.

CRACK (To).—This is said of a horse that gives way and falls behind the moment he is caught up with.

CROSS.—Equivalent to Barney. A double cross, where the party who agrees to lose either wins or tries to win without giving warning to his confederates.

CAMPAIGN.—A racing tour through the country during the season.

CATCH.—To fall quickly into the proper stride.

CAUTION.—To admonish a jockey or driver against an infraction of the rules.

CIRCUIT.—A number of tracks associated together, as the Grand Circuit, Eastern Circuit, etc.

CLAIM.—To protest; to claim a name for any horse.

CLUCK.—To make a clucking sound to encourage a horse to greater exertion.

CUP.—When a track is so moist that the horse's feet make distinct impressions it is said to "cup."

CUT DOWN.—To run a horse into another and injure his limbs so as to disable him.

CUT IN.—To take advantage of an opening.

CUT OUT.—To lead the others from the start; to set the pace.

DAISY-CUTTER.—A horse that keeps his feet near the ground in trotting or running.

DEAD ONE.—A horse that will not run, or has no chance to win, or is not meant to win.

DASH.—A single heat of one or more miles.

DEAD BEAT.—Beaten to a standstill.

DEAD HEAT.—When two or more horses cross the score at the same instant.

DISTANCE.—In races of mile heats, eighty yards; of two mile heats, 150 yards; of three mile heats, 220 yards; of mile heats, three in five, 100 yards.

DOPED.—Temporary improved appearance through the use of drugs.

DOPED.—When a horse has been drugged to cause him to lose a race he is said to have been dosed.

DRAWN.—Withdrawn before or during a race.

DUFFER.—A horse which loses heart or will not exert himself during a race.

ENTRY.—To post the names of an owner and horse to go in a race.

END TO END.—A race in which the pace is forced from start to finish.

FEATHERWEIGHT.—Seventy-five pounds. If all the contestants in a race were privileged to "feather" it would be a race at catchweights, although ordinarily "catchweight" means that the owner of a horse can place any weight upon him that he chooses, and he is presumed to choose the lightest practicable.

FILLY.—A mare until she has completed her fourth year.

FIXED.—A race which is decided, before coming off, to go a certain way is said to have been "fixed."

FLAG.—The signal used by the judge to shut out or distance a horse.

FLUKE.—When a horse has won a race through an accident. A "scratch."

FREE HANDICAP.—A free handicap where the owner, if he does not like the weight imposed by the handicapper, may withdraw his horse without paying forfeit.

FOR BLOOD.—When the horse is driven to win.

FORFEIT.—To pay forfeit; nonfulfillment of the conditions.

GAD.—To whip or lash a horse.

GET AWAY.—To rush from the score.

GO AS THEY PLEASE.—To wagon, harness, or under saddle, as the owner pleases.

GONE WRONG.—Out of condition, off the feed, or incapable of further turf use or training.

GENTLEMAN RIDER.—An amateur, or one who does not ride for pay.

GOT AT.—See "Nobble."

HANDS DOWN.—A horse that wins without the aid of his jockey, and by the sheer force of his own speed is said to "win with (his jockey's) hands down."

HULL DOWN.—In its application to the turf, a horse that is so far behind that he has no chance to win.

HANDICAPPED.—Weighted according to age, or the distance to be run or trotted.

HARNESS.—When a horse trots to sulky he is said to go in "harness."

HEADED.—To lead the way by a head; to be led by a head.

HEAT.—A division of the distance of a race, as half-mile heats, mile heats, etc.

HIPPODROME.—A race that aims at gate money only while professing to be for a stake, purse, or prize.

HOME STRIDE.—The last quarter of a track.

HURDLE.—A fence-like arrangement used in hurdle-races for horses to jump over.

IN CONDITION.—A term used by trainers to express a horse's being in good form for racing.

JOCKEY.—Driver or horsedealer.

JOG.—Used where a horse has won easily. "He came in on a jog."

LEADERS.—The first horses in a race of many.

LEFT AT THE POST.—Where a horse scores for race, but refuses to go on.

LEVEL-HEADED.—Steady. The opposite of flighty.

LIFT.—Manipulating the reins to rouse a horse to greater exertion.

MAIDEN.—A horse that has never won a running race.

MATCH RACE.—One made expressly between horses, usually not more than two, in contra-distinction to a race for a purse.

MILE AND REPEAT.—A race in which a mile is trotted and then repeated, the horse winning each mile being the winner.

MIXED-GAITED.—When a horse changes from a trot to a pace, or runs in front and trots behind, he is said to be mixed-gaited.

MOUNT.—A jockey who is engaged to ride a horse in a race is said to have been given the mount.

MUSICIAN.—A horse that roars.

NOBBLE.—To poison a horse on the eve of a race, or otherwise unfit him.

NAMING AT POST.—Naming the starters at the starting post; used on the running turf.

NOMINATION.—The entry or naming of a horse or embryo foal for a race.

OFF.—Out of condition; off the feed.

OPEN THE GAP.—To draw away from the others.

OFFICE.—Secret information as to the condition of a horse or the purpose in the race of those who have him in charge. See Tip and Straight Tip.

ON.—To be "on" is to back a horse. A person

is also "on" who fancies he knows what will be the outcome of a race that other persons believe is to be conducted squarely.

OUTSIDERS.—Persons who do not, in one way or another, thrive by means of racing. "Producer," has a similar meaning.

PULLING A HORSE.—Riding or driving to lose. Erroneously called "hippodroming."

PUNTING.—When a man backs a horse for small stakes he is "a punter;" if he uses the money won on one race to bet on the one next succeeding, he is "playing on velvet." That is, he cannot lose more than he wins.

PERMISSION.—Assent from the judges to dismount or get out of the sulky.

PLATES.—Light shoes worn by horses in a race.

PLAY OR PAY.—Start or lose the money paid for entry.

POLE.—The inside in a race; inside fence of a track.

POLE-HORSE.—The near horse of a double team; the one having the inside of the track.

POOL.—Combining or aggregating bets. A clique.

POOLING.—To combine in betting.

PROTEST.—A complaint made to the judges for having been fouled or otherwise obstructed; a complaint against a horse, driver, or jockey who is not qualified to enter in the race or go upon the track.

PULLED.—A horse prevented by his driver from winning a race is said to have been pulled.

PULLER.—A horse that draws by his mouth.

QUARTER-HORSE.—In running-turf parlance, a horse good for a short distance only.

QUARTER-POLE.—The first dividing mark of a mile track.

QUITTER.—A horse that loses heart in a race.

RACKER.—A horse having a gait between a pace and a trot.

RATTLE-HEADED.—Unsteady, flighty, unreliable.

RECALL.—A call back after a false start.

RECORD.—The time made by a horse, under the rules; specifically, his best time.

RIGHT OFF THE REEL.—Winning in straight heats; which see.

RINGER.—A running or trotting horse that is entered for or participates under another than his proper name in races slower than those of his class.

ROAD-HORSE.—A horse used for road-driving; a gentleman's driving horse.



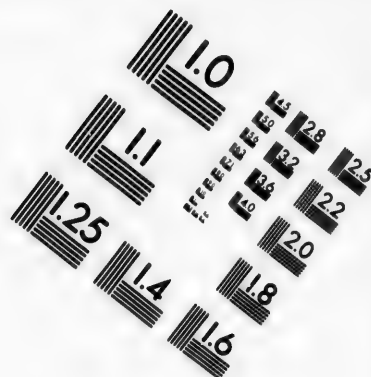
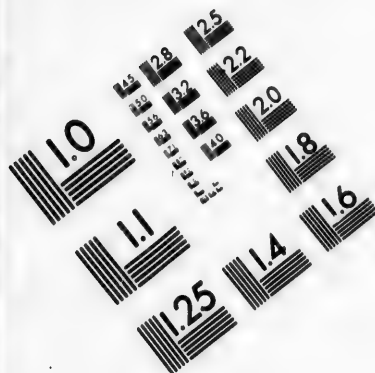
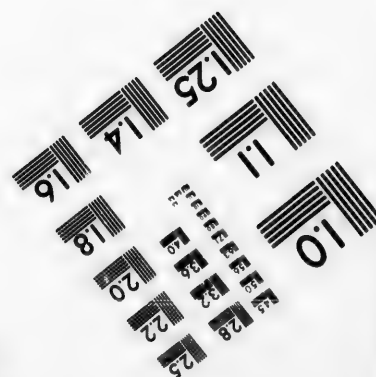
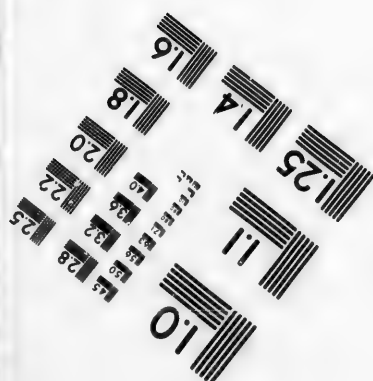
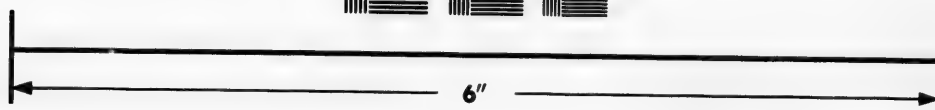
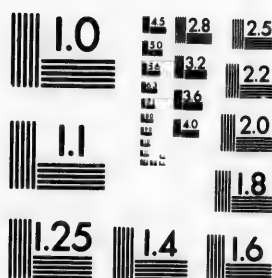


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ROARER.—A horse that is broken-winded or breathes loudly.

RULED OFF.—Banished from a track, or tracks, for infraction of rules.

RULES TO GOVERN.—Governed by certain rules, as, the National Association rules.

RUCK.—The main body of horses in a running race. See Leaders, Tailers and Whippers-In.

SHUT OUT.—A horse that is distanced.

SANDWICHED.—When running and trotting races are alternated at the same meeting, the events are said to be sandwiched.

SCORE.—The starting-point on a track; to score for a start.

SCRATCH.—The accidental winning of a race.

SEASON.—The duration of racing or stud service for the year.

SENT.—Driven to win, or driven fast.

SET BACK.—When a horse has finished first in a heat through an infraction of the rules, the second horse is given his place; the first horse is said to be "set back."

SHAKE UP.—To rouse up or encourage a horse.

SHUT OUT.—Distanced; prevented from getting ahead of the others.

SIDE-WHEELER.—A pacer.

SKIP.—A short break.

SPIN.—A short burst of speed; a sharp drive; used in road-driving.

SPLIT HEATS.—Heats divided among the contestants.

SPOKED.—Having the spokes taken out of a wheel by the hub of another's vehicle.

SQUARE AWAY.—To get away steady from the start.

SQUARE-GAITED.—Level, steady-going action.

SQUARE TROTTER.—Steady trotting in 1-2-3-4 time.

STARTER.—The person who sees that the horses are in proper positions and get away together.

STAYER.—A horse with the ability to go a long race without distress.

STEADY.—Pure-gaited, level-headed.

STEADYING.—To keep a horse well in hand.

STEEPLE-CHASE.—A running race in which fences, ditches, and other obstructions are to be leaped.

STRAIGHT TIP.—Secret information given by the owner, trainer or rider of a horse in regard to the race.

STRAIGHT HEATS.—Heats of races won in succession by one horse. The race is not one of straight

heats if the first heat is "dead" or is lost by a horse that wins the race in the next consecutive heats.

STRIDE.—The distance from the point where a horse's hind foot leaves the ground, to where it is put down.

SUGARED.—Bribed, or paid to throw a race or heat.

SUSPENDED.—Ruled off a track or tracks for a time.

SWEEPSTAKES.—A race in which the winner or first and second horses take the stakes, each owner contributing an equal amount.

SWERVE.—Going out of the regular course; cutting in ahead of an opponent.

TAILERS.—The last horses in a race of many.

TICKER.—Stop-watch.

TIME-BAR.—A record which bars a horse from entering in a slower class.

TIP.—Secret information given regarding a horse in a race.

TRACK HORSE.—A horse used exclusively for racing.

TRAIN ON.—When a horse is able to race season after season, and improve.

TRIAL.—A private test of a horse's speed.

TURNED OUT.—Withdrawn from the turf and stabled or pastured.

TOUTS.—Hangers-on around stables, picking up information and selling it.

UNTRIED HORSE.—A stallion or mare whose progeny has not yet been a winner.

UNPLACED.—On the running turf, where more than four start, the first four are numbered as they cross the score at the finish; the rest are unplaced.

WAGON (To).—To be driven to a skeleton four-wheeled vehicle.

WALK OVER.—A race in which all the contestants but one are withdrawn.

WEAVER.—A pacer is sometimes called a weaver from the peculiar motion of the head and neck while in action.

WEIGHING-IN.—Weighing the jockeys with their whips and saddles, or drivers in a handicap race, before the start.

WEIGHTS.—Metal for a horse's feet, to steady him or convert from one gait to another. Metal carried by a driver to bring him to the required weight.

WEIGHT-FOR-AGE.—The handicap or weight apportioned to a horse according to age.

WELTER WEIGHTS.—Heavy weights.

WINDEN.—Blown out, exhausted.
WINNING STRAIGHT.—Winning in straight heats.
WIRE.—The line from the judges' stand which marks the score.
WORD.—The signal from the judges for a fair start.
WHIPPERS-IN.—The last horses in a race of many.
WEARING SILK.—A jockey dressed in the full suit of his stable.
WELCHER.—One who bets with no intention or means of paying if he loses.

CHAPTER XXV.

EXPLANATION OF SOME PRINCIPAL VETERINARY TERMS.

ABSORBENTS.—Medicines which neutralize acidity in stomach; those (other than blisters) used externally, to reduce enlargements; medicines which have the effect of counteracting and absorbing abnormal collections of fluid within the system. In physiology or anatomy, absorbents of the system, a term applied to the lacteal and lymphatic vessels.

ACETATE.—The product of the union of vinegar (acetic acid) with an alkaline or metallic base; those generally used being ammonia, lead, potash, or zinc.

ACRID.—Applied to that which has a hot, biting taste.

ACUPRESSURE.—Relating to arresting hemorrhage by means of a needle, passed twice through the wounded substance at the side next the heart.

ACUTE.—A disease which has a certain degree of severity, a rapid progress, and short duration, is said to be acute.

ADHERENCE.—Sticking close to, as the skin to the ribs when an animal is hidebound.

ADIPOSE TISSUE.—Fat held in the meshes of cellular tissue.

ADIPOSE ARTERIES.—The branches of the renal arteries, as they supply the fat around the kidneys.

ETHER.—A volatile liquor obtained by distillation from a mixture of alcohol and a concentrated acid.

ALBUMEN.—A white substance found in serum, chyle, synovia, serous fluids, etc.

ALBUMINURIA.—A condition of the urine in which it contains albumen, which will coagulate by the addition of nitric acid and heat.

ALKALOID.—A name given to the organic alkalies, to distinguish them from the mineral; brucia, emetia, morphia, strychnia, etc., are alkaloids.

ALIMENT.—Any substance which, if introduced into the system, is capable of nourishing it and repairing its losses.

ALTERATIVES.—Applied to medicines which re-establish the healthy functions of the system without any sensible evacuation.

AMAUROSIS.—Partial or total loss of vision from paralysis of the retina, accompanied by dilatation, but occasionally contraction of the iris, which is frequently paralyzed.

AMMONIA.—A colorless, transparent, elastic gas. Inhaled unmixed or undiluted with common air, it instantly causes suffocation.

ANÆMIA.—The opposite of plethora; poverty of the blood, in which there are too few red corpuscles and too many white. It is marked by great debility and weakness, and a diminution in the fluids in the capillary vessels.

ANÆSTHESIA.—Privation of sensation, loss, or paralysis of sensibility; the effect produced by an over-dose of chloroform, ether, etc.

ANALYSIS.—The separation of a compound body into its constituent parts; the solution of anything into its first elements; an examination of the different parts of a subject separately.

ANASARCA.—Dropsical swellings in the legs, abdomen, chest, etc.

ANATOMY.—Formerly meant dissection; now it expresses the shape, situation, number, structure and connection of the different portions of organized bodies. Dissection and knowledge of the lower animals is called comparative anatomy; that of man human anatomy.

ANBURY.—A soft, spongy tumor, met with in horses and cows.

ANTHELMINTICS.—Medicines which cause the destruction or expulsion of worms.

ANTIDOTE.—A remedy which has the power of combating, neutralizing, or rendering poisons harmless.

ANUS.—The extremity of the rectum, the fundament.

APERIENTS.—Medicines which gently open the bowels.

APOPLEXY.—An effusion of blood occurring suddenly into the substance of an organ or tissue, but generally used with reference to an effusion of blood into the substance of the brain.

APPROXIMATION.—Placing parts together; generally

applied to the reduction of fractures; synonymous with apposition in soft parts.

ARTERIES.—Vessels which carry the blood from the heart to the various parts of the system.

ARTICULATIONS.—The fastenings of the various bones of the skeleton in their natural situation. They are divided into movable and immovable. The joints are also called articulations.

ATROPHY.—Wasting or emaciation, unaccompanied by fever.

AUSCULTATION.—The act of listening to sounds given by particular parts of the body when struck, or to the sounds produced by the functional movement of the lungs or heart.

BACK RAKING.—Introducing the hand into the rectum to extract the feces.

BARBS.—The bars of the hoof are two ridges of horn, passing from the heels of the hoof toward the toe of the frog. Those of the mouth, transverse ridges on the roof thereof.

BLOOD SPAVIN, BOG SPAVIN.—See spavin.

BOTTS.—Larva of the bott-fly found attached to the horse's stomach.

BROKEN WIND.—A disease caused by constriction or deformity of the windpipe.

CALLUS.—A substance deposited between the divided portions of a fractured bone; also unnatural hardness of any soft part; thickening of the cuticle.

CANKER.—A fetid, colorless discharge from the frog, and having an offensive odor.

CAPPED HOCK.—A swelling on the point of the hock.

CARTILAGE.—A solid of the body between bone and ligament.

CATARACT.—An opacity of the crystalline lens or its capsule, causing partial or total blindness.

CAUSTIC.—A substance which, by its chemical properties, destroys the texture of organized bodies. The pure alkalies, the concentrated mineral acids, lunar caustic, etc., are caustics.

CAUTERY.—The application of a caustic substance, or of a hot iron; the latter is termed actual cautery.

CIRCULATION.—Vital action by which the blood passes from the heart through the arteries; diminishing in size they end in minute ramifications on the entire surface, where they are connected to correspondingly minute veins, which, increasing in size, return the blood to the heart. Hence we have arterial and venous circulation.

CLYSTER.—A liquid thrown into the large intestines by means of a syringe or pipe; the nozzle of the syringe or pipe being introduced into the anus.

COLIC.—Acute pain in the abdomen, aggravated at intervals.

COLON.—That portion of the large intestine extending from the cæcum to the rectum. It was once supposed to be the seat of colic.

CONTAGION.—That which is communicated by actual or near contact, as glanders, contagious pleuropneumonia, etc.

CRAMP.—Spasmodic and involuntary contraction of muscles.

CURB.—A swelling, first soft, then hard, on the back part of the hind leg, a little below the point of the hock.

DENTITION.—The development of the teeth, of which there are two sets, the temporary and permanent. The former are twenty-four in number in the horse; twelve incisors and twelve molars. The permanent are, in the horse, forty in number, in the mare, thirty-six, owing to the absence of the tushes or bridle teeth.

DIABETES.—A disease occasioning great increase and alteration in the secretion of urine, with excessive thirst and progressive emaciation.

DIAGNOSIS.—Signs or symptoms by which one disease is distinguished from another.

DISINFECTANT.—Agents that neutralize morbid effluvia; also agents capable of removing any septic condition of the living body or any part of it.

DRASTIC.—Purgatives which operate powerfully.

DRENCH.—Liquid given through the mouth by means of a bottle, etc.

ENOLLIENT.—An agent softening or soothing an irritated surface, or one harsh from dryness.

EMPIRICISM.—The knowledge of physic acquired by experience alone.

ENDEMIC.—A disease that is general in a locality.

ENDERMATIC.—Medicines rubbed into the skin, or sprinkled thereon, where a blister has previously been formed.

EPIDEMIC.—Any disease which affects animals generally at one time. (See Contagion, Endemic, Sporadic, etc.)

FISTULA.—A deep, narrow, chronic abscess often extending to the bone.

FOMENTATION.—Bathing by the application of hot

cloths previously saturated with hot liquid, or by the hot liquid itself.

GANGRENE.—Incipient mortification. Attended with inflammation it is termed hot; inflammation absent it is termed cold; if the part affected contains more or less of decomposed fluids it is termed humid. It is also called moist and dry, according to the appearance and the exciting cause.

GLANDERS.—An incurable and virulent contagious disease, equally destructive of human and equine life.

HIDE-BOUND.—The adherence of the horse's skin to the ribs, etc., from wasting disease.

INFLUENZA.—An epidemic disease characterized by the suddenness of its attack, general depression; heaviness of the eyes, and by a distressing fever, sometimes called epizootic.

HEAVES.—A disease due to rupture and enlargement of the air cells of the lungs.

INJECTION.—Any medicated liquid thrown into a natural or other cavity by means of a syringe; a clyster.

JAUNDICE.—Disease characterized by yellowness of the eyes, skin and urine, with general languor and lassitude.

JUGULAR.—Relating to the throat. Jugular vein; the throat vein.

LAXATIVE.—A medicine to gently open the bowels.

LIVER.—The largest gland in the body. Its office is to secrete the bile.

MALARIA.—Infectious gases from decayed animal or vegetable matter.

MAMMARY GLAND.—The organ which secretes the milk.

MANGE.—A contagious disease of the skin, caused by the presence of parasites (*acari*).

MEMBRANE.—A skin-like tissue of interwoven fibers covering some part of the body; sometimes it forms a secreting surface.

MENINGITIS.—Inflammation of the membranes of the brain.

MIASM, MIASMA.—Impalpable germs of disease, the product of decay or putrefaction of animal or vegetable substances.

MILK FEVER.—Fever accompanying or preceding the secretion of milk soon after parturition.

NARCOTIC.—An agent that produces sleep or stupor.

ORGANIC.—Relating to, or acting by means of organs. Used to express a disease of structure, the

word functional being used to describe one of function.

OSSEOUS.—Of the nature of bone; bony.

PALLIATIVE.—Relieving but not curing.

PLEURA.—A serous membrane, divided into two portions, lining the right and left cavities of the thorax, and reflected over each lung.

PNEUMONIA.—Inflammation of the lungs.

CELL EVIL.—A disease occurring on the summit of the head, causing inflammation, resulting in suppuration and the production of abscesses round the attachments of the ligaments near.

PROUD FLESH.—Fungus growth of flesh on an ulcer, or excessive granulation.

PUS.—A cream-like fluid in abscesses, or on the surface of sores; the matter of sores.

QUITTOR.—A chronic abscess in the hoof; suppuration setting in, a sinuous fistula is formed.

REMITTENT.—Applied to symptoms which abate considerably and then return again and again.

ROARING.—The disease termed by English authors "broken-wind," in the United States is called heaves. The disease recognized in the United States as broken-wind is named roaring in England. (See Broken-wind.)

SCAB.—An incrustation which forms upon a sore, owing to the concretion of the fluid discharged therefrom.

SEDATIVES.—(See Tonics.)

SINUS.—The cavity of a sore; a long, hollow track leading from some abscess, diseased bone, etc.

SPAVIN.—Bone spavin is an exostosis in the region of the hock. Bog spavin occurs in the capsule, between the tibia and astragalus.

SPLINT.—An osseous deposit between the large metacarpal, or cannon, or shank bone, and the two small metacarpal bones.

SPORADIC.—Applied to diseases not epidemic, and attack few at a time, from causes peculiar to each case; confined to a locality.

SPRAIN.—Shifting of a joint further than the normal conformation of bones and ligaments allow, but not so as to produce dislocation.

STAGGERS.—A disease resulting from some cerebral lesion, and implying a loss of control of voluntary motion and want of sensation.

STIMULANTS.—(See Tonics.)

SUTURE.—A seam; the union of flat bones by their margins, as in the skull; mechanical means or sub-

stances for keeping soft parts in apposition, as the mouth of wounds, etc.

TETANUS.—A disease in which the muscles of voluntary motion are spasmodically contracted, causing rigidity of the parts affected; confined to the face it is called trismus or lockjaw; when general, tetanus.

TONICS.—Medicines to produce permanent, but scarcely perceptible excitement of the vital functions; they differ alike from stimulants, which immediately and sensibly excite, and from sedatives, which depress.

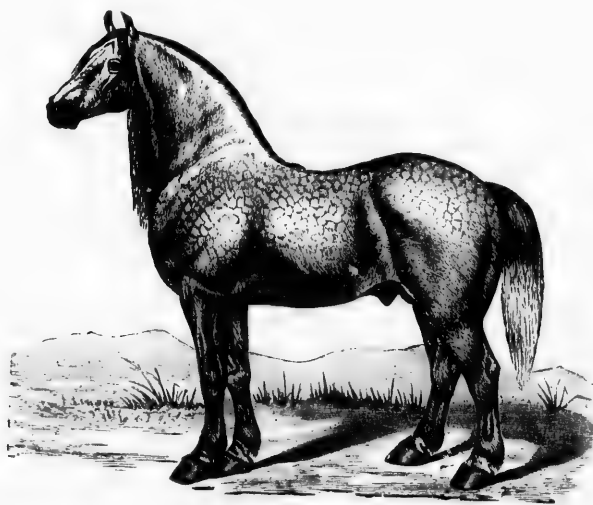
UTERUS.—The hollow, muscular organ designed

for the lodgment and nourishment of the fœtus from the moment of conception till birth.

VETERINARY.—Originally pertaining to a beast of burden. Now especially applied to properly qualified persons, who make animal surgery and medicine a profession.

WINDGALLS.—A distention of the synovial membrane of the fetlock or other joints, caused by over-exertion.

WOUND.—Any breach of the skin and flesh of an animal, caused by external violence. It may be contused, incised, lacerated, punctured or poisoned.



Principles and Practice of Shoeing.

CHAPTER I.

SECTION I.—THE HOOF IN RELATION TO SHOEING.

It has been stated by good authority—we quote from memory—that "Certain sorts of shoes may be adjuncts to good shoeing, but they are not essential to it. That without a healthy foot any shoe will more or less fail; with a healthy foot most sorts of shoes will answer measurably well." This is borne out by practice. It often takes much bad shoeing to seriously disorganize the foot of the horse, but once really disorganized its integrity cannot be fully restored. Hence we see the necessity of preserving the crust of the hoof, whole or entire, except to reduce the growth, simply as we should the nails of the fingers when too much grown. The preservation of the sole and frog is no less important.

THE TOE OF THE HORSE.

The foot of the horse is the toe, in fact, and he walks on the toe, while man walks on the whole foot, which corresponds anatomically in the horse to the whole leg from the hock down. But that which we call the foot of the horse is composed of the outer case, consisting of the wall, the bars, the sole and the frog. Within this case is the sensitive vascular structure, and the two bones, the lower called the *os pedis* or heart-shaped bone, and above this the navicular bone; above these and above the hoof are, first, the small pastern bone, and still above this, the great pastern bone. If we preserve the outer case or hoof, that is, the crust bars, sole and frog entire, the sensitive and bony structure inside will remain sound, except in case of accident or constitutional disease.

THE CRUST OR WALL.

The crust or wall of the hoof consists of hollow fibers running down longitudinally from the coronet. These fibers carry soft cellular material, which constitutes the nutrition forming the crust. The crust grows really from the thickened skin around the coronet—is, in fact, simply a changed condition of the skin. This material, as it descends in the crust, becomes more and more dry and horny, so that the fibers are at length in a condition to stand wear and pressure without sensation, and in the lower parts, if not worn off by friction on the ground, must at length be removed artificially, as it is renewed from above. Hence we see the necessity that the shoer understand how this is formed in order that he may work understandingly in the removal, if any, of so much only as may be absolutely necessary.

THE NATURAL HOOF.

In a state of nature the growth of the hoof is equal to the wear, on ordinary soils. Yet on the great plains, for instance, where the wear is but little, we often find the hoofs of the horse grow out to immense proportions. Yet this does not essentially alter the inner construction of the foot, nor does it interfere with the true action of the sole or frog. The hoof simply spreads out so as to cover a great ground surface. Nevertheless, it constitutes a disability, for only with a normal hoof can the animal perform its proper work.

SECTION II.—HOT FITTING OF SHOES.

There is much controversy, from time to time, among working shoers, in relation to the proper manner of paring the hoof and fitting the shoes. Hot fitting that is burning the shoe on the hoof, is

only practiced by men not skilled in the use of the rasp. If by hot fitting is meant burning down the sole until the shoe is fully seated, we would say such a man should never be allowed to tamper with the hoof of a horse. If it is meant, however, simply warming the crust of a hoof, brittle and hard from having run out long on dry pasture, and so as to soften it that the knife may take hold, and, when this hoof had been pared down to proper proportions, then to place the warm shoe on the sole simply to even the inequalities, and give a uniform bearing, the whole becomes a different matter.

It is idle to suppose that a shoer who understands his business would actually burn the hoof into shape. If he should, no sensible horse-owner will long employ him. The real shoer fits the shoe to the hoof and not the hoof to the shoe. In this he must understand the practical application of a correct knowledge



A Perfectly Shaped Hoof.

of the anatomy of the foot to the work in hand. No two hoofs are alike, and the peculiarities of the foot, gait, conformation of the limbs, and how the horse stands on them, must be taken into consideration. We give a cut of a perfectly formed hoof fitted for the shoe and with the feather edge taken off below, also as showing the seat of quarter crack, and also toe crack. In relation to the application of a very hot shoe to the sole of the foot, whatever the purpose for which it is applied, the shoer must understand that there is danger of the heat penetrating deeply, after the heated shoe is withdrawn. In the cut *a* shows the seat of toe crack, *b* the seat of quarter crack. At the top is the juncture between the hair and hoof, or the coronet.

The story of the barefooted boy whose sole had become horny from constant contact with the ground, and, when stepping on a piece of hot iron, so remained for some time, unconscious of the danger, has been often told, and may serve as illustration here. When the burn had actually reached the sensitive parts, the accumulated heat in the hard skin continued to enter deeper and deeper, and serious and long continued lameness ensued. It is a parallel case with the hoof of a horse. The actual burn may not reach the sensitive tissue until the hot shoe is withdrawn, and yet the injury from burning may be severe. A heated shoe, therefore, must be applied with caution and for a specific purpose, and always with a knowledge of cause and effect.

SECTION III.—STRUCTURE AND PROCESSES OF THE FOOT OF THE HORSE.

Mr. John Palmer, a shoer of valuable horses in Chicago, writes as follows from a practical standpoint upon this subject:

To a common observer the foot may appear a mass of insensible horn, but it is composed of an assemblage of springs, especially when considered in relation to the foreleg, which wonderfully adapts it not only to the use of the animal itself but to the use of man also, and so carefully has it been guarded that were the animal employed only to supply the simple necessities of man his feet would last as long, even if not shod, as any part of his body. The immoderate exertion in which he is now generally employed accounts for the great number of cripples that come constantly under our notice.

In the examination of the foot we find in its horny covering another simple and effectual spring, simple as to its construction, and effectual as to the purpose which it answers; this is that of yielding to the impulse of the animal's weight, and thereby breaking the shock which otherwise would be destructive to the foot itself.

The hoof is a secretion from the living part of the foot, not wholly from the coronet, but from the living surface which it covers, named by Professor Colman, the laminated substance of the foot, and by others the elastic laminae or processes of the foot. As the quantity of horn necessary for the defense of the sensitive foot is considerable, a large quantity of blood is distributed to it for the purpose, and is sup-

plied by two large arteries which pass down on each side of the pastern. These give off considerable branches to the frog cartilages and coronary ring, but the trunk of the artery enters in at the posterior and inferior part of the coffin bone and deviates into eight branches within the bone, which pass out at the circumference or angle of the toe. (Turn to the pages relating to the limbs and feet of the horse for a full elucidation of the subject. Pages 80 to 87.)

DISTRIBUTION OF BLOOD IN THE FOOT.

The distribution of blood to the frog is remarkable. There are several branches of considerable size, that do not give off branches as in other parts of the foot, until they arrive near the surface and spread into innumerable ones, supplying the skin or secreting surface of the frog, and communicating with those of the skin of the sole, so that the frog and sole form one continued surface of skin of muscularity and sensibility, but greatly inferior in both respects to the laminated vessels and nerves in any other part of the body. From this view of the foot it will appear that when the horse stands in the stable without exercise, the veins of the fore leg do not return the blood freely for want of the pressure which exercise occasions. (See cuts and matter relating to dissections of the foot in previous pages.)

CARTILAGE AND BONE.

The blood, therefore, accumulates in the foot. The vessels of laminated substance, from the pressure of the hoof, admit only of a determinate quantity, especially at that part where the horn is remarkably thick and where elasticity is not so essential. The lateral cartilages are two elastic bodies attached to the coffin bone at its upper part, and proceeding backward like expanded wings terminate at the extremity of the heel. They assist in expanding the heels and quarters. The navicular or nut bone is placed behind the coffin bone, and is attached to it as well as to the small pastern bones, and affords a slippery surface for the flexor tendon to move upon. This bone, with the coffin and small pastern, forms the coffin joint.

The small pastern thus articulates with the coffin bone and the nut bone below, and with the great pastern above. These are all the bones comprehended in a description of the foot. The coffin bone is completely cellular throughout, and has more blood within it than any one in the body, though not far from being the smallest of the whole. The great

flexor tendon is inserted into the bottom of the coffin bone and the extensor tendon on its front and upper part. (See figures 14 and 15, page 87.)

Thus the sensitive foot is composed of the pastern, the navicular and the coffin bone, the lateral cartilages, the sensitive frog and sole, and the laminated substance at the upper part of which there is a hard cartilaginous ring, named the coronary ligament.

CHAPTER II.

THE PRACTICE OF SHOEING.

SECTION I.—WHAT WE SHOE FOR.

Horses are shod, first, to prevent undue wearing of the hoofs; second, to enable the animal to preserve a firmer footing on slippery or hard ground; and third, under certain circumstances, to prevent bruise of the sole.

In shoeing it is necessary to preserve the health of the foot, and to so do the work that the shoe will remain intact under any ordinary amount of wear, as well as in deep ground. Racing horses require the lightest shoes, trotting horses those a little heavier. Road horses and all horses of ordinary draft require a shoe of medium weight. Farm horses come under this category. Heavy draft horses, especially in cities, require the heaviest class of shoes. We shall confine our directions to the shoes for saddle, road and farm horses, since these all require measurably lighter weights in the shoe than do the medium or heavy draft horses of cities.

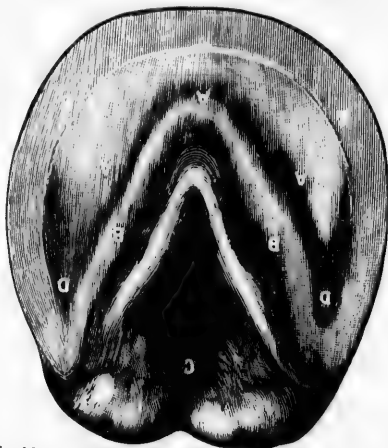
SECTION II.—BREADTH OF THE FORE SHOE.

For ordinary riding horses, carriage horses, and general purpose horse, it is usual to make the shoe about one inch wide. Three-quarters of an inch is sufficient for the driving horse. The crust or wall of the foot, including the substance intervening between the crust proper and the sensitive laminae, is about three-quarters of an inch in width. The shoe must be as wide as the weight-bearing structure. The crust of the hoof is the weight-bearing structure. It must rest not on a part, but on the whole of this structure. To enable it to do so the shoe must, contrary to the usual practice, be made flat toward the foot.

The shoe must not be wider than the weight-bearing structure. Any greater width than this must be useless, and moreover, will be the means of allowing dirt and gravel to lodge between the shoe

and the recessed sole, and will also render the shoe liable to be sucked off in deep ground.

The shoe should be of even width until it approaches the heels. Toward the heels, where the crust gradually comes to a point at its junction with the bars (See sole of foot, ground surface, annexed,



Sole of Foot, Ground Surface.—A, A, sole; B, B, Bars; C, frog; D, D, Seat of Corn.

letter B.) the shoe must also come to a rounded point, the inner edge of its heels exactly following and resting on the bars. (See bars in sole of foot.)

The narrowing of the web of the fore shoe at the heels may seem wrong to those not accustomed to it. But it is the shape which nature has chosen for the crust at its junction with the bars, and hence must not be altered. The ordinary square heels are objectionable, because that part which overlaps either the crust or the bars, rests on nothing, hence is useless, and in fact affords means for wrenching off the shoe in many places.

SECTION III.—THE WEIGHT OF SHOES.

The thickness of a shoe should be just that which will not spring unduly. Every ounce added thereto tells on the strength and availability of the horse. No shoe should be made with a view of being worn out on the hoof. It is this that causes nearly all the disabilities of the foot, allowing, of course, that the shoes have been properly put on. A month is the

full time a shoe should remain on the hoof of a young horse, and six weeks the limit for a mature animal, and this whether they work or not.

Nine ounces may be taken as the minimum weight, and fourteen as the maximum weight for road, light draft, carriage and farm horses. Sixteen ounces is heavy enough for the heaviest farm and carriage horses.

Never have a shoe reset when worn thin. The wear will be but little on the ordinary earth roads of the west and south; on more gritty or stony roads it is cheaper to pay for a new shoe than to force the horse to carry a great mass of iron. Try the difference yourself between a medium, well-fitting shoe, and one with an inch of leather and four ounces of nails in the soles.

SECTION IV.—THE UPPER SURFACE OF THE SHOE.

The upper surface of the shoe should be flat so it may rest on the entire surface of the crust. This crust is what nature intended as the sustaining surface which bears the weight of the horse. Unshod it does so, when the foot is normal. If the weight is not so sustained the horse eventually goes tender-footed. Hence a shoe should never be seated out (hollowed from the crust and sole) so that the shoe only rests on a portion of the crust. If the crust is unduly rasped, or cut away, its weakened condition causes it to give way under the weight of the horse and the stroke of the foot. The blacksmith who unduly cuts away the crust and then hollows out the sole, and causes a shoe to be seated out to remove the pressure, has to learn the first principles of his profession. It stands to reason that the diffusion of weight is most perfectly preserved, when the widest possible bearing is obtained for the shoe. But this bearing must come only on the crust. The unshod horse goes perfectly sound and natural on his feet, so long as the crust is not worn down, allowing the sole to bear on the ground; then he goes lame, and he does so if in shoeing the weight is not borne on the crust.

SECTION V.—THE GROUND SURFACE OF THE SHOE.

The under surface of the shoe should be concave; the natural hoof is so. If the upper surface of the shoe is seated out, the under or ground surface cannot be concave, since the shoe would not have sufficient strength. Double seating would weaken the shoe. The concave form of the ground surface of a

shoe grips to the ground, and avoids the liability to slip. (See cut, concave shoe.)

SECTION VI.—LENGTH OF AND HEELS OF THE SHOE.

The length of the crust (see cut of the ground surface of the hoof) determines the length of the shoe. If shorter than the crust, the heels of the shoe press upon and bruise the seat of corns. If longer than the crust the hind shoes are apt to strike and catch the heel of the fore shoes. If just the length of the crust they will not catch unless in the case of the natural clicker. Such horses must be specially



Concave Shoe.

shod. Increased weight in the fore shoes will generally obviate the difficulty.

FITTING THE SHOE.

Use the knife as little as possible on the hoof. Lower the crust only so much as needed by the rasp, bring it perfectly flat and true, and round off the outer edge only slightly. Never apply a shoe smaller than the crust, and rasp away the crust to it. It will soon destroy the integrity of the crust. If larger than the crust, it is apt to cause treads, and other injuries may result. Fit the shoe so its outer edge corresponds exactly with the crust. The smith who fits the hoof to the shoe, should never be allowed in a shop. It costs time to fit the shoe properly. It should be cheerfully paid for. The horse owner cannot afford to have his steed go with bad fitting shoes. It is

dangerous to the rider and driver, and will surely detract in many ways from the value of the horse. Let the shoe be tried on sufficiently warm to mark the crust. It is difficult to correctly fit a shoe without such marking, but this must be no excuse for burning down the crust.

Do not be led into error by the assertion of ignorant men that a close fitting shoe will not allow for expansion of the foot. The nails must inevitably be driven and clinched to hold the shoe quite firm. The shoe, of necessity, must be fitted accurately to the inside of the hoof to prevent treads, cutting or interfering. There is no proof that there is either contraction or expansion of the hoof when bearing the weight of the horse. Both of these directly opposite theories have been advanced. There is a certain degree of elasticity to horn. There is no proof that there is expansion. There should be no contraction of the feet if the horse is properly shod and the shoes removed often enough. The feet of racing and trotting horses are proof of this. A hoof butcher is never allowed to pick up the hoof of one of these horses.

SECTION VII.—ABOUT HORSE SHOE NAILS.

In removing a shoe, cut the clenches of the nails carefully; ease the nails down by careful racking of the shoe with the gripe; then draw each nail separately. The tearing of the hoof by violently wrenching off the shoe, is dangerous to the crust. Examine the nails frequently after shoeing to know that they remain tight; if not, have them tightened.

THE NUMBER AND SIZE OF NAILS IN A SHOE.

The weight of the horse, size of the shoe, toughness and thickness of the crust, and the nature of the work must determine this. For light work and a tough crust, five nails to a shoe. The inner crust is thinnest. It is the seat of contraction, and hence one nail less should be used on the inside than on the outside. The shoes should be examined daily, and if a nail is broken it should be replaced. Heavy horses and heavy shoes require four nails to the outside and three to the inside of each shoe. One great cause of the breaking of nails is that they do not fit the countersinking of the shoe. The heads of the nails should fit exactly, and they should not extend below the level of the shoe; then if properly driven and clenched they will "stick."

The nails should be brought out of the hoof about an inch above the shoe. The nail holes of the shoe

should be nearer the outside than the inside of the shoe, when the crust is normal. If the crust is very thin, the holes must correspond. This thinness of crust is induced by the vicious practice of rasping the outside of the hoofs. In this case the nails must be driven "fine" to prevent pricking. The outer crust of the hoof should never be rasped. The shoer who does this to make a neat job should never be employed.

CLENCHING THE NAILS.

Never rasp the crust with the corner of the rasp in preparing the nail for clenching. Good nails will clench without filing a notch on the under side. For a very tender crust the under side of the nail may be slightly filed; it will bend easier, but filing weakens the clench. Break the nail off short, turn down and flatten with the hammer, and in this do not hammer the crust. When five nails are used in the fore shoes the hind shoes should have six; and when seven are used in the fore shoes, eight should be used in the hind shoes; and this because the hind feet are the real propelling power of the horse; besides this, there is a twist to the hind limbs in turning, and kicking and stamping is harder on the hind than the fore shoes.

SECTION VIII.—FULLERED SHOES.

Fullering is the groove extending round the web of the shoe. Its only advantage is to enable the smith to punch the nail holes more accurately. The bar shoe shows fullering. The idea that the groove prevents slipping is without force, and the theory that the groove protects the nail heads is nonsense. The nail heads should not project beyond the sole of the shoe. It is the countersinking that protects the nail heads. The causes of the loss of shoes are, from the use of bad nails; or from not removing broken or defective nails; from rasping and other mutilation of the crust of the hoof; too much filing of the clenches; wearing off of the heads of nails; from having the shoes wider or longer than the crust, and from overreach. Accidents aside, all these may be prevented. Shoes will seldom be lost from sound feet except from wear, if they have been placed as directed.

SECTION IX.—THE HIND FOOT AND SHOE.

The general principles are the same as those which regulate the shoeing of the fore-foot. The crust must not be rasped, the sole must not be pared out, the frog must not be mutilated, and the shoe must

be accurately fitted. There are, however, some points of difference between the hind and fore-feet. The crust or wall of the hind foot is more upright than that of the fore-foot. It is also thinner. As it is thinner—narrower—the web of the shoe must also be narrower. It should not much exceed half an inch, which is the normal width of the crust. (See hind shoe.)

The height of the shoe should be the same at both heels. It is common to make the outside heel, to which the calkin is usually applied, higher than the inside heel. Any deviation from the arrangement of nature will be liable to cause disease, es-



Hind Shoe.

pecially in the hocks. To prevent over-reach, the under inner rear edge of the hind shoe should be rounded off. (See hind shoe.)

SECTION X.—CALKINS.

Calkins are used generally as a stay to the foot, which may be needed in heavy draft work or on slippery ground, and sometimes for the purpose of effecting an alteration in the action, and also in certain diseases.

Calkins, though sometimes necessary, are in all cases more or less of an evil. They are not required for ordinary riding or driving. They are usually worn away long before the horse is re-shod, and

horses go no worse toward the end of 'a set of shoes than at the beginning.

Calkins are an evil, because they interfere with the natural bearing of the foot on the ground; because they deprive the hinder portion of the foot of its fair share of work and pressure; because they unduly raise the hind quarter and thereby tend to increase the risk of sprain so common in the hock; because they are a frequent cause of injury from treads and kicks, and because they make both treads and kicks, when they occur, more severe than they would otherwise be. Calkins on the inside are especially apt to cause injuries from treads.

If, however, it is thought necessary to use calkins, the better plan is to apply them to the outside heels only, and the heels of the shoe on the inside should

clips are hammered down sharp, being of iron, the heels, the important integer in roughing, soon wear dull. It is usual, for working on ice, to steel the heels as well as the toes. Even then on frosty roads they soon get smooth. Steel studs are without doubt the most practical means of giving foot-hold to either driving or farm horses. One should be inserted in



Shoe and Calk.

each heel and one in the toe if necessary. (See cut illustrating the idea.)

Mr. Fleming, a veterinary surgeon of England who has given particular study to the horse's foot, recommends them, and we always used them for working on ice and slippery roads in winter, when managing a farm. In Russia and some other portions of northern Europe this system is quite common. We have illustrated the shoe and studs, and give the system condensed from Mr. Fleming's statement.

This plan consists in driving a steel stud, slightly tapering at one end and pointed at the other, into holes in the shoe—these holes being two or three in number, one at each heel, and one at the toe, if necessary. (See shoe and calk.)

The method is applicable to any kind of shoe and for any kind of work. The holes are punched when the shoes are being fitted. Heavy draft horses should have three holes in each shoe, saddle horses two, one at each heel, and driving horses the same number. The hole is made by a slightly tapering square punch, which is about one fourth of an inch in size at the point; the punch is driven into the shoe as far as possible on the ground or lower surface, and a very light back-punching cuts out the scrap of metal and leaves the hole clean. The hole



Fore Shoe.

be proportionately thickened, so as to give a level bearing to the foot on the ground.

A calkin should be turned up wide (See a ground surface of fore shoe) and made of steel. If made, as is often the case, narrow, or little more than a spike, it soon wears down and ceases to be of any use.

SECTION XL.—ROUGHING SHOES.

Shoes should never be roughed except for traveling on ice or ground made slippery from sleet. If

is a little larger on the ground than on the upper or foot surface. It must not be distorted by subsequent hammering, as it should be exactly square like the punch.

The stud is made from a three-eighths steel rod. The point is drawn out on the off-side of the anvil, then the rod is cut nearly through at about an inch from the end, and the slight taper of the portion which fits into the shoe is given by a few blows of the hammer on the near side of the anvil. The stud is broken off ready for use—no filing or other preparation being necessary. With very little practice a smith can make seventy, eighty, or ninety in an hour without any gauge but merely the eye. The stud varies from one to one and a half inch, but of course it may be of any length or size, so long as the punch is of the same thickness.

No precaution is required to keep the holes clear when the stud is not in use, as the point of a nail or an awl will free them from dirt, when necessary. The stud should fit the hole tightly, but must not pass quite through the shoe. When inserted, it should be fastened in by one or two sharp taps on the point; the horse's weight then drives it home. The studs, of course, need only be inserted when the horses have to travel on icy or slippery roads. They can be removed by a few taps on the face of the shoe, when they jump out. When worn very low in the shoe, a hammer and "buffer," or chisel, may be needed to start them.

A set of studs will last for a number of days. Going on a journey in winter, a few of these studs may be carried in readiness for contingencies. They never break, and if properly made very rarely fall out. They can be fixed in the shoes or removed in a few minutes.

SECTION XII.—FARMERS' WORK AND TIPS.

As a rule farm horses, unless working continuously on hard roads, require very little shoeing. The substitution of tips for shoes may be generally made with profit to the owner and benefit to the horse. If used on colts, when first shod, the heels and frogs remain sound. If used on a horse shod for years the heels and frogs must have time to harden before being used on hard roads. You cannot pull off the shoes of a horse, substitute tips and start him on a journey on hard roads. It would be like pulling the shoes and stockings from a man or

boy and then marching him through a stubble field, yet in process of time the feet may get hard enough to stand a newly burned prairie. It is measurably the same with a horse. We have illustrated the plan of shoeing with tips to make all clear. There is little danger of contraction. They may be used on all ordinary driving horses, on street railway horses and generally by farmers, and will allow the frog to remain healthy and save contraction and other diseases of the foot. But for road work the tip may very properly be made somewhat longer than shown, but not long enough to extend more than to the quarter (narrowing) of the hoof.

A tip should cover the toe and anterior portion only of the quarter, whilst the heels and bars are left



A Tip.

uncovered, or unprotected, as some call it. The length of the tip should be somewhat less than half that of the ordinary shoe. Tips are generally made much too long; so much so, that they are little else than short shoes, and of course produce the many evils of such shoes.

The advantages gained by the use of tips have been summed up thus: "1st. Freedom is secured to the heels, which are the most common seat of contraction. Whatever a shoe may do, a tip cannot cause contraction at the heels. 2d. Concussion, and the diseases which arise from it, must be greatly diminished by substituting the natural action of the heels and frog for the jar of the iron shoe against the ground. 3d. The heels and frog are strengthened and developed by being brought more actively and prominently into work and wear. 4th. The liability to slip is much less in horses shod with tips than with any kind of shoe, because the heels per-

form their functions more perfectly when brought in contact with the ground than when elevated from it by a shoe. The frog and bars are, from their structure, the natural stays of the foot against slipping."

The objections urged against tips, that they do not afford sufficient protection to the foot; that a horse cannot travel safely over stones, and that on hard roads and with hard work the frogs and heels will be worn away, has been amply disproved, except in the case of heavy draft horses. The long or modified tip has been in constant use over cobble and granite block pavement for more than a year by the North Chicago City Railway Company.

BAR SHOES.

For tender soles, when it is necessary to protect sole and frog, the bar shoe is sometimes used. It is liable to objection, and many devices to obviate its

In the other the frog does not come in contact with the shoe, which is solely supported by the crust and bars. It may thus be made either to defend the frog or the heels, whichever may be in fault, and is one of the most valuable aids to veterinary surgery. Should the frog be more prominent than the crust, the shoe may be made thin in proportion, at the part where it covers the former, and by this means it may be made exactly to fit the two when it is desired to divide the weight between them. There are many weak-heeled harness horses which would do their work far better if they were shod in this way, and but for the danger of pulling these shoes off, and the little hold which they take of the ground, a modified form might be used with advantage. Many horses might sometimes be advantageously shod with the bar shoe. It is unsightly, however, and generally marks the existence of some disease, but its use is to relieve disability or disease.

CHAPTER III.

WHAT GOOD AUTHORITIES SAY.

SECTION I.—A COMPETENT ENGLISH AUTHORITY ON SHOEING.

The following are points from Major General Sir F. Fitzwygram, an English authority fully competent to speak upon the horse's foot, and showing through the careful study he has made personally in these matters from the latest known principles and best practice:

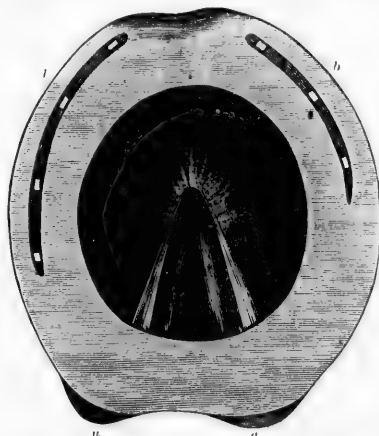
DIRECTIONS FOR SHOEING ORDINARY FORE-FEET.

1. With your rasp remove from the ground surface of the crust as much as may represent a month's growth. Remember that there is usually a more rapid growth of horn at the toe than at the heels or quarters. More, therefore, will require to be taken off the toe than from other parts—in other words, shorten the toe. Having lowered the crust to the necessary extent, make the under or ground surface perfectly level with the rasp.

2. Round off the lower edge of the crust with the rasp in the manner shown in cut of hoof. Do this carefully and thoroughly. If a sharp edge be left the crust will be apt to split and chip.

The preparation of the foot is now complete. It remains to fit the shoe to the foot.

3. Make a shoe with a three-quarters-inch web, of even width all round except toward the heels, flat toward the sole, concave toward the ground.



Bar Shoe not Nailed and Portion of Hoof, *aa* Bulbous Heels of the Foot. *bb* Fullering and Nail Holes.

use have been invented, but not successfully. The bar shoe consists of a simple ring of iron, similar in shape to the ordinary shoe as far as back of the quarters, but from that part bending inwards to meet the web of the opposite side, with which it is welded. It is used for two purposes exactly the reverse of each other. In the one case the foot is so prepared that the frog shall touch the shoe, while the heels are quite free, and are thereby relieved from all pressure.

4. Make the anterior portion, *i. e.*, the toe of the shoe, somewhat square from quarter to quarter, so as to fit and correspond with the shortened toe.

5. Make five countersunk holes in each shoe, *viz.*, three on the outside and two on the inside. Make the anterior hole on each side in the anterior portion of the quarter (not in the toe), just behind where the shoe begins to be squared off in front. In this position it will be just behind the line of greatest wear. Let the second and third nails on the outside evenly divide the remaining distance to the heels; let the second nail on the inside be exactly opposite the second nail on the outside.

6. Fit the shoe accurately to the foot. It must be as large as the crust, but no part must project beyond it. The shoe must be as long as the crust at the heels, but not longer.

7. The web of the shoe must be narrowed at the heels, so that its inner edge may rest on and cover the line of the bars, but no more.

8. Slope off the heels of the shoe in the same direction as the fibers of the crust, so as to prevent the possibility of their catching in the toe of the hind shoe.

9. Select nails which will fit exactly into and completely fill the nail-holes.

10. Twist off the clenches as short as possible, re-hammer the nail-heads, then turn the clenches down with the hammer, and let the pincers during this time be firmly pressed against the heads of the nails. The clenches must not be filed either before or after turning down, nor is a ledge to be made in the crust to receive them.

DIRECTIONS FOR SHOEING HORSES WITH ORDINARY HIND FEET.

1. For ordinary hind feet the pattern of shoe in common use is recommended, but with a clip on each side instead of a single clip at the toe.

2. The web should be made somewhat wider at the toe than in the other parts, in order to allow space for the thorough sloping off of its inner edge and for the prevention of over-reach.

3. Six nails, *viz.*, three on each side, are needed to hold a hind shoe securely in its place. From the peculiar action of the hind-quarters and the greater length of the hind leg, the hind is more liable to get twisted than the fore shoe; and, again, it is more apt to be displaced by stamping and kicking.

4. The other directions given above, as regards

lowering the crust, rounding off its inferior edge, accurate fitting, clenching, etc., apply equally to hind as to fore-feet.

FORM OF THE TOE OF THE FORE-SHOE.

If it be desired to maintain in the shod horse the natural and really level bearing and tread of the foot, it will be necessary to turn up the toe of the shoe in the same manner as the toe of the unshod foot would be naturally worn away and turned up by friction with the ground.

Most persons must have noticed how badly many horses go when newly shod, and how apt they are to stumble, and that it is not until the shoes have been worn some days that they seem again to go at their ease. The reason of this is simple enough. The horse has neither ease, comfort, or safety in traveling, until by friction with the ground he has worn off some portion of the projecting toe of the straight shoe. But the relief gained by wearing away the toe of the shoe is only comparative, and is very inferior to that gained by the use of turned-up shoes, adjusted to fit the crust, previously shortened and lowered to represent the natural rounding off of the toe by wear in the unshod horse.

The evils occasioned by the ordinary straight shoe may be summed up briefly as follows: 1st, stumbling and inconvenience to the horse in action; 2d, a tendency to contraction of the heels and shriveling up of the frog from absence of a due and natural proportion of wear at the back part of the foot; 3d, loss of speed from resistance of the toe against the ground; 4th, undue strain on the flexor tendons, whose office is to raise and flex the leg; 5th, undue stress on the suspensory ligament. In action, when the foot is brought to the ground, a great portion of the weight falls on this ligament. Straight toes, by interfering with the fair and natural bearing of the foot on the ground, have a tendency to throw an unnatural stress on it.

Straight toes have a tendency to produce these results, but they do not produce them to the extent which might be expected, because the animal frame has been so beautifully and aptly constituted by nature that it will stand a good deal of mismanagement without sustaining any material injury.

Many objections have been raised to the turned-up shoes now recommended. Among the most prominent are:—1st. That the horse, when so shod, cannot get a fair, level, and natural bearing on the

ground with his foot. The objection, if well founded, would be fatal to the proposed plan, but the even wear of the shoes disproves it. 2d. That horses will be liable to fall and come on their heads when deprived of the fulcrum of the toe against the ground. This objection will not stand inquiry. Horses generally stumble from striking their toes against the ground. They are certainly not saved from falling by the length of the toe. On the contrary, it is usually the length of the toe which first causes the horse to stumble, and afterward prevents him from recovering himself, the toe forming the lever which overbalances him. 3d. It is urged that a horse must be much more liable to slip in turned-up than in ordinary shoes. This objection, though at first sight it may seem formidable, arises from misconception of the functions of the different parts of the frame. The frog and bars are, from their structure, the stays of the foot against the ground. Turned-up shoes, by causing the weight and wear to be evenly distributed over the foot, develop the frog and bars, and, therefore, instead of facilitating, must have a tendency to prevent slipping. 4th. It is alleged that turned-up shoes are unsightly and make a horse look as if he wanted shoeing. The first of these two objections is a matter of opinion; the second is a matter of habit. Lastly, it is urged that the toes in the new-born foal are not turned up. Assuredly not, for the feet have not yet been subjected to wear.

FITTING OF TURNED-UP SHOES.

Both skill and practice are necessary in fitting a shoe to the natural tread. A farrier seldom succeeds well in his earlier attempts. The following hints may assist the workman: The turn-up of the shoe is made on the horn of the anvil by beating out the toe of the shoe. The process of beating out the web at the toe will necessarily make it wider. This extra width must be removed by the file, for, as has been recommended above, the web should be of even width all round. The breadth of the turn-up must be from the anterior part of the quarter on one side to the corresponding part on the other side. The degree of turn-up is, of course, greater at the toe than at the sides. A very common error is committed by merely turning up the point of the toe. This may be of some use in preventing stumbling, but it is not sufficient to restore the natural tread, nor to make the wear nearly even all over the shoe.

To effect this object the turn-up must be broad, namely, from the anterior part of each quarter. The farrier has always a simple guide in the old shoe. Where he finds undue friction going on he must ease off the part, and not attempt to fight against nature by thickening it or by inserting a bit of steel.

SECTION II.—MR. THOMAS LEGGETT'S PRACTICE IN SHOEING.

Thomas Leggett, foreman of the shoeing shop of the Chicago West Division Railway Company, remarked to the writer that he causes the shoe to be so placed as to allow the spread of the heel, using care so the frog may be free to touch the ground, thereby insuring elasticity in the tread and preventing jar to the shoulder.

In case of corn, Mr. Leggett simply has a piece removed from the shoe, so the corn may not be pressed on, thus leaving it untouched. In relation to the frog, the surface is simply taken care of, allowing it to spread, leaving it as spongy (elastic) as possible, thus avoiding all danger of thrush, and of the disabilities arising from severe cutting of the frog.

The shoe is so placed that the frog is about one-thirty-second of an inch lower than the shoe, the object of the shoe being simply to protect the toe of the hoof. On the fore feet he uses fourteen ounce shoes, and on the hind feet sixteen ounce shoes. All the shoes are put on cold. Little and sometimes no cutting is done, but the toe is kept in balance. If a horse interferes he cuts a corner off the outside, making about a three-quarter shoe; if the interfering is on the inside, *vice versa*.

SECTION III.—MR. A. S. BEAMISH ON FITTING SHOES.

Mr. Beamish, a high class Chicago shoer, in answer to our interrogatory, said: First carefully cut the clinches before removing the shoe. Rasp or pare the loose portions of the foot with much care; leave the foot strong, as it is very easy to cut off, while only nature can put it on. Never touch the frog except in case of thrush or disease, as it is the chief support of the foot. Next fit the shoe perfectly level, and fit the shoe to the foot, not the foot to the shoe. Always take a shaving from the toe in case of corns or bad heels, and then draw the toe nails tighter, and that will ease the heels. Calk very low, as it is most natural to keep the foot as close to the moisture as possible. Light horses travel much better without calks, but on our Chicago paved and macadamized streets they slip down and strain themselves, then the horseshoer is blamed.

The greatest secret in horseshoeing is good practice, common sense, good judgment and good, sober men. One of the greatest evils of our business is shoeing too cheap. Unless a sufficient charge is made to warrant taking ample time to prepare the hoof and shoe properly, the result is sure to be a "botch." The owner of the horse may profit temporarily, but the poor beast has to suffer much pain, and will, in a very short time, become comparatively useless.

SECTION IV.—TO SHOE A KICKING HORSE.

In answer to the question, a blacksmith noted for his skill in shoeing unruly horses without the use of straps, said if a horse is found a determined kicker, proceed as follows:—Take a strap one and one-quarter inches wide and about five feet long; pass the middle of the strap around the front to the back part, below the pastern; then cross the strap on the back of the leg, holding the foot up in proper shape for driving on the shoe; next buckle the strap securely above the hock, and the horse cannot kick nor can he strain himself.

SECTION V.—INTERFERING AND CORNS.

Mr. M. Brannan, an accomplished Chicago shoer, says:—A horse that interferes can be prevented by proper shoeing, without altering the hoof, and in

most cases better the condition of lameness. I level and straighten the foot, then fit the shoe cold without burning the hoof at all. To prevent interfering, I shape and place the shoe so that the foot when raised must spread, and in every case find it does its work, though one must vary the shape of the shoe more or less to meet the requirements of the horse in question. In case of corns or quarter cracks I, under no circumstances, trim the frog, but keep the foot as close to the ground as possible, for they, as man that feels, suffer.

Another correspondent, in relation to interfering, says:—Ankle cutting behind is caused by improper balancing of the foot, and to cure it the foot should be leveled and straightened. If the horse cuts with the toe, apply a shoe having a long calkin at the heel of the inside branch, and a calk attached to the inside curve of the toe, and the heel will serve as a brace to keep the foot from tilting inward. If he cuts with either heel or quarters cut the shoe off at inside toe or shoe light. The same styles of shoes will serve in almost all cases of ankle hitting. But it sometimes happens that the interfering trouble is not relieved by the expedients first described, and then special kinds of shoes are necessary. In cases where the horse hits with the quarter or heel of the shoe use a three-quarter shoe.

Cattle Breeding and Cattle Feeding.

CHAPTER I.

INTRODUCTION OF CATTLE INTO THE UNITED STATES.

SECTION I.—ORIGIN OF AMERICAN CATTLE.

The introduction of cattle into the colonies of Great Britain, in America, and which subsequently became the United States, were from various sources. The Dutch, who originally held New York, sent cattle from the Netherlands, and thus what we now call Holstein and Dutch Friesian cattle, but which really should be known as Netherland cattle, were among the first introduced. The early English settlers brought cattle from their respective localities, and thus all the then known English breeds obtained a strong foothold. In the New England states the Devons early formed a nucleus, from their several qualities of ability to forage, great working quality, rich milk and excellent beef. The hornless cattle of England also were introduced and became favorites in other localities, and the presumption is fair that all the known superior breeds of the sixteenth and seventeenth and eighteenth centuries became fully localized prior to the outbreak of the revolutionary war.

CANADIAN CATTLE.

In Canada the French early obtained a foothold, and with them, Norman and Percheron horses; then, Breton, Normandy and other excellent breeds were introduced. When Canada came under the domination of Great Britain English cattle followed and at length a mixed race here arose, which were freely distributed over the border.

THE CATTLE OF SPAIN.

The Spaniards, though not a colonizing race in the sense of settling a country for the development of its agricultural resources, have nevertheless been a most important integer in introducing what now constitute vast herds of the descendants of Spanish

cattle, either pure or mixed, throughout the gulf states, Texas and California. These cattle range throughout Mexico, Central America, and crossing the line we find, south of the equator, in the temperate and semi-tropical plains or pampas region, countless herds of these long-horned semi-wild cattle.

SECTION II.—INTRODUCTION OF SUPERIOR BREEDS WEST.

Upon the settlement of the country lying west of the Alleghenies the mixed breeds of cattle in the eastern states, made up of Devon, Galloway, Netherlands cattle; those brought to America by the German (Hessian) settlers of Pennsylvania, and the Teeswater and Herefordshire and other cattle of the various emigrations; all found a home and were intermingled. In an early day late in the last century the Durham, or Teeswater breed, was introduced into Kentucky, being known often by the name of their introducer, as the Patton for instance, celebrated in the early settlement of the west for size, fine feeding and uniform high milking qualities. They were essentially what we call Shorthorns, and as we knew them forty-five years ago, better cattle than many short-horn families of to-day, that have been bred simply for style and the show ring.

THE KENTUCKY IMPORTATION.

The Kentucky importation of 1817 added to the value of western cattle. They were pure Shorthorns, great milkers and beef-makers, and the best of their day. Their descendants, of our time, are probably as good as the best where both milk and beef are desired.

THE OHIO AND ILLINOIS IMPORTATION.

In 1884 an association of gentlemen in Ohio imported Shorthorns of the best English blood. This was followed in 1885 and 1886 by further importation. It gave a great impetus to the breeding of these admirable cattle. In 1888 the distribution of

Shorthorns of more or less mixed blood had become general throughout Indiana, Illinois and Missouri, and had extended to Michigan, Wisconsin, Iowa and even into Minnesota. In this year an association was formed under the name of the Illinois Importation Company. In July of that year the committee returned from England with twenty Shorthorns, besides horses, sheep and swine. Since that time other importations have filled the west with the descendants of these admirable beef cattle.

HEREFORDS IN THE WEST.

Hereford cattle were early brought to the west, the first pure cattle being brought into Ohio in 1852-53 by Thomas Aston and John Humphries, two English farmers of Elyria. Others followed, and later breeders of Illinois and Indiana began to make direct importations. To-day they have been generally distributed over the whole West, have been carried to the great plains and the valleys of the Rocky Mountains, where they fully hold their own with the Shorthorns as beef-makers, as they do in the show rings where exhibited.

DAIRY CATTLE.

The great dairy interests of the west culled for distinctively milking cattle. Ayrshires and Alderneys (now known as Jerseys) early found a place. Later the Holstein and Dutch-Friesian—really Netherlands cattle—proved themselves at home in the great prairie region, and they are now widely disseminated, proving as valuable as great milkers and as cheese producers as have the Jerseys for the exceeding richness of their milk and the quality of the butter made therefrom. The west has become the great center of the beef making, and the great dairy breeds of cattle, and nowhere can be found such herds constituting in their outcome all that goes to make up excellence in the production of either beef, milk, butter or cheese.

SECTION III.—OUR NATIVE CATTLE.

What we understand by native cattle are not cattle indigenous to a country or a portion of a country. The only native cattle of America are found in the once great herds of buffalo (bison) which once roamed over all the plains and prairie region, and the musk ox of the country to the north. The so-called native cattle are the descendants of the various breeds originally brought from Great Britain and the countries of continental Europe, by the em-

igrants who successively first settled the various states of the union—Florida under Spanish rule, Louisiana under Spanish and subsequently under French rule, Texas and Mexico under Spanish rule, and Canada first under French rule and afterward under English rule.

Spanish cattle have made no impress, except in California, Oregon, and the western plains, outside of the countries where originally introduced, since they have not been elsewhere used for breeding.

Our native cattle, therefore, are a mixed race, made up principally of the old Devon, Hereford, Galloway, Yorkshire, Ayrshire and Teeswater cattle, the next strongest intermixture being Netherlands cattle, and the last of all the French breeds; and this for the reason that the cattle of the early French emigrants were almost entirely localized when first introduced.

In New York, New Jersey, and portions of Pennsylvania, the Netherlands infusion is strongest seen. In New England the Devon blood was strongly marked, as it also was in Maryland. In Virginia the Durham early got a foothold, was early transferred to Kentucky, and hence Shorthorn blood naturally became diffused all over the west, and until within comparatively a few years, were the only improved stock, and to-day they largely predominate in all the western states.

CHAPTER II.

IMPROVED BREEDS OF CATTLE.

SECTION I.—THE FOUR GREAT DIVISIONS OF CATTLE.

Originally cattle were divided into three great distinctive divisions, arising from the appearance of their horns, and designated Long-horns, Middle-horns and Short-horns. We must add now a fourth distinctive division—the polled or hornless cattle. Of these the short-horned cattle comprise the greatest number of breeds either uniting both milk and beef excellences, or as embodying one of these qualities in a most eminent degree. Those showing the best combination, early maturity, milk and beef, are sub-families of the Short-horn breeds. Ayrshires also combine milk and beef-making qualities, but are of later maturity. The Dutch or Netherlands cattle, variously called Holstein and Dutch-Friesian, are the greatest milk-producers known, and their immense frames are well adapted to beef-making, but

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SHORT-HORN COW, HOKANNA'S ROSE.



they lack early maturity. The same may be said of another Short-horned tribe—the Channel Island cattle, the two principal divisions of which now are named Jerseys and Guernseys. Precocity of growth is always antagonistic to the full development of milk—only found in a fully mature animal of any kind.

In considering the several divisions, therefore, we shall do so only in their capacity either for milk or beef, since within the last forty years cattle have been bred exclusively for three special purposes,—beef, richness of milk or great quantity of milk. In considering the principal breeds I shall also give in this chapter the characteristics as they were known in the early part of the century, and from the best authorities extant at that time. The consideration of the more modern improved breeds being confined only to the Shorthorn, Hereford, Devon, Ayrshire, Guernsey, Jersey, Netherlands (Holstein and Dutch-Friesian), Swiss cattle and Polled cattle, as constituting all the breeds of especial value in the west. Of these the distinctively beef breeds are Shorthorn, Hereford, Polled cattle and Devon; and of milking breeds, the Netherlands cattle, Ayrshire, Jersey, Guernsey and Swiss cattle, being breeds pre-eminent for milk, rich in butter and cheese-making constituents.

SECTION II.—LONG-HORNED CATTLE.

All the domestic varieties of cattle were probably derived from a long-horned race, since the almost universal type of those which escape from domesticity, or which are allowed to run in a semi-wild condition, as on the great plains of Hungary, Russia in Europe and Asia, and the great plains of North and South America, are of this type. On the other hand the improved breeds of the day are all of the Middle, Short-horned, or else of hornless breeds. Of the semi-wild breeds, like the Texans, nothing need here be said, and of the Long-horned superior breeds of England of the beginning of the century, nothing more will be written except a description of some of them, as they existed, with the exception of the West Highland cattle of Scotland, which perhaps may have some merits in an unusually inhospitable and mountain country. In the United States, however, the Devons may well take their place.

IRISH CATTLE.

There have long been two breeds of cattle in Ireland—the Long-horned and a Middle-horned race.

The Middle-horns seem to have been the original breed, native to the forest and mountain region. The other breed seems to have been the larger, resembling the Lancashire or Craven, thought to be the original of the Long-horned varieties of British cattle.

ENGLISH LONG-HORNS.

The Long-horns of England came originally from Craven in Yorkshire. Their name was derived from their great length of horn, often cumbrously so. They were successively improved by such great breeders as Bakewell, Culley, etc., but their success was short-lived. The Short-horns, in their improved forms, gradually superseded them.

LANCASHIRE CATTLE.

The Lancashire Long-haired breed were distinguished by the thickness and firmness of their hide, the length and closeness of their hair, large hoofs, and coarse, leathery, thick necks, deep fore-quarters and light hind-quarters. They were narrow in shape, were said to weigh well, and their milk, though deficient in quantity, was rich in cream. They are also reported to have been more varied in color than other breeds; but whatever the color, a white streak along the back, termed by breeders finched, and a white spot on the hock, seem to have been constant.

SECTION III.—MIDDLE-HORNED BREEDS.

The Middle-horned cattle were, it is probable, originally the predominant improved race of Great Britain. They are found in all the milder districts of England, Scotland, Ireland and Wales. Of the improved Middle-horns, only the Devons, Sussex and Herefords are considered valuable in the United States. Of these cattle we give the following account as contained in various writings of the latter part of the last and the early part of the present century.

THE NORTH DEVON.

The following synopsis is from Youatt and other contemporary writers: "Of this breed the bull should have yellowish horns, placed neither too low nor too high, nor be too thick, but growing gradually less toward the points; the eye clear, prominent and bright; the forehead small, flat, and indented; the muzzle fine; the cheek small; the nose of a clear yellow, the nostril high and open; the neck thick, and the hair about the head curled. The head of

the ox is smaller, otherwise he does not differ materially from the shape of the bull; his action is free, and he is quicker in his movements than any of our oxen; but his legs are apparently placed too much under his chest for speed, yet he possesses this property in an eminent degree; his legs are straight, the forearm is large and strong; the bones of the leg, especially below the knee, very small; the tail is set high, on a level with the back, rarely much elevated, never depressed, is long and taper, with a bunch of hair at the end; the skin is very elastic, mellow, and rather thin; some have smooth hair, which should be fine and glossy; some curly, and these are rather the most hardy and fatten the best; red is the most favorite color; many, however, are brown, and others are approaching to chestnut. Those of a yellow color are reported to be subject to the *steat* (diarrhoea).

"The Devon cow is much smaller than the bull; she has a full, round, clear eye, the countenance cheerful, the muzzle orange or yellow, the jaws free from thickness, and the throat from dewlap. On all soils, except the very heavy, the Devon ox is very superior at the plough, for its quickness of action, docility, good temper, stoutness, and honesty. It is always worked in yokes. Four Devon oxen are considered equal in their work to three horses; they are commonly worked from two years old until they are four, five, or six, and then in ten or twelve months, on grass and hay, they are fit for market. Neither corn, cake, nor turnips are needed for them during the first winter. They fatten faster and with less food than most others; their flesh is excellent. Some comparative experiments between the Devon and other cattle were made by the Duke of Bedford, of which the following table gives the result. They were fed from November 16, 1797, until December 10, 1798.

	First Weight.			Gained.	Consumed.		
					Oil Cake.	Tur-nips.	Hay.
1. Hereford.....	17	0	1	24 3	—	2700	487
2. —————	18	1	0	41 5	428	2712	432
3. Devon.....	14	1	7	45 4	438	2668	295
4. —————	14	2	4	61 6	442	2656	442
5. Sussex.....	10	2	0	45 4	432	2655	392
6. Leicester.....	15	2	14	40 2	434	2652	400

"There is much difference of opinion with regard to the fitness of Devon cows for the dairy, it being pretty generally asserted that their acknowledged grazing qualities render them unfit for the dairy: that

their milk is rich, but deficient in quantity; but there are many very superior judges who prefer them even for the dairy. Of the calves, those which are dropped about Michaelmas time are preferred to those which are calved in January or February. They allow the calf to suck three times a day for a week; then new warm milk is given it for three weeks longer; then it has warm scalded milk mixed with a small portion of finely divided linseed cake, and its meals are gradually lessened, and at four months old it is entirely weaned."—*Yonatt on Cattle.*

THE HEREFORDS.

The Herefords, as compared with the Devons, were much larger, the color, as reported by the older writers, being of a darker red, some a dark yellow, and a few brindled, and they generally had white faces, bellies and throats. They are also recorded as having thicker hides than the Devons, as being more hardy, shorter in the carcass and leg, and as being higher, heavier, and broader in the chine, with more fat, and rounder and wider across the hips, the thighs more muscular, the shoulders larger. Marshall has described them correctly as follows: "The countenance pleasant, cheerful, open; the forehead broad; eye full and lively; horns bright, taper, and spreading; head small; chap lean; neck long and tapering; chest deep; bosom broad, and projecting forward; shoulder-bone thin, flat, no way protuberant in bone, but full and mellow in flesh; chest full; loin broad; hips standing wide, and level with the spine; quarters long and wide at the neck; rump even with the general level of the back, not drooping nor standing high and sharp above the quarters; tail slender, and neatly haired; barrel round and roomy, the carcass throughout deep and well spread; ribs broad, standing close and flat on the outer surface, forming a smooth, even barrel, the hindmost large and of full length; round bone small, snug, not prominent; thigh clean, and regularly tapering; legs upright and short; bone below the knee and hock, small; feet of middle size; cod and twist round and full; flank large; flesh everywhere mellow, soft, yielding pleasantly to the touch, especially on the chine, the shoulder, and the ribs; hide mellow, supple, of a middle thickness, and loose; coat neatly haired, bright, and silky; color of a middle red, with a bald face, characteristic of the true Herefordshire breed."

THE SUSSEX.

Of these cattle, as they existed three-quarters of a century ago, we find, by reference to Youatt, they had a small and well-turned head, but coarser than that of the Devon, the horns pushing forward a little, and then turning upward, thin, tapering, and long, not so as to confound the breed with the Longhorns, and yet in some cases a little approaching to them. The eye is full, large, and mild in the ox, but with some degree of unquietness in the cow; the throat clean, and the neck, compared with either the long or Shorthorns, long and thin, yet evidently coarser than that of the Devon. The shoulder is the principal defect. There is more wideness and roundness on the withers; it is a straighter line from the summit of the withers toward the back; there is no projecting point of the shoulder when the animal is looked at from behind, but the whole of the fore-quarter is thickly covered with flesh, giving too much weight to the coarser and less profitable parts; but then the fore-legs are wider apart, straighter, and more perpendicular than in the Devon, and are placed more under the body than seeming to be attached to the sides. The fore-arm is large and muscular; the legs, though coarser than those of the Devon, are small and fine downwards, particularly below the fetlock. The barrel is round and deep. In the back, no rising spinal processes are to be seen, but rather a central depression; and the line of the back, if broken, is only done so by a lump of fat rising between the hips; the belly and flank are capacious; there is room before for the heart and lungs, and there is room behind in the capacious belly for the full exercise of its functions; yet the beast is well ribbed home; the space between the last rib and the hip-bone is often very small, and there is no hanging heaviness of the belly or flank. The loins of the Sussex ox are wide; the hip-bone does not rise high, nor is it ragged externally; but it is large and spread out, and the space between the hips is well filled up. The tail, fine and thin, is set on lower than in the Devon, yet the rump is nearly as straight. The hind-quarters are cleanly made, and if the thighs appear to be straight without, there is plenty of fullness within. The Sussex ox has all the activity of the Devon and the strength of the Hereford, the propensity to fatten, and the beautiful fine-grained flesh of both. It possesses as many of the good qualities of both as can be com-

bined in one frame. By crossing them with the Herefords, a heavier animal, but not fattening so profitably, or working so kindly, is produced. When the Sussex has been crossed with the Devon, a lighter breed has resulted, but not gaining in activity, while it is materially deteriorated in its grazing properties. The color of the Sussex ox is a deep chestnut-red, or blood bay. The black, or black and white, generally indicate some strain in the breed, as a cross from the Welsh. The hide of the true Sussex ox is soft and mellow, the coat short and sleek.

The Sussex cow, says Mr. Youatt, is not a favorite with the generality of farmers. She does not answer for the dairy, for her milk, although of very good quality, is far inferior in quantity to either the Holderness or the Suffolk cow. They are, moreover, what their countenance indicates, of an unquiet temper, and are commonly restless and dissatisfied, especially if not bred on the farm on which they are kept. They are, therefore, chiefly kept as breeders; are generally in fair condition, even while milking; and no cows, except the Devon or Hereford, will thrive so fast after being dried; they fatten even faster than the ox.

The Sussex of to-day, however, while retaining their distinctive excellences, have been bred finer and are among the best cattle combining excellences for beef, labor and milk. The illustration shows a high caste Sussex of to-day.

NATIVE WELSH CATTLE.

The cattle of Wales were described as follows: The cattle of Wales are principally of the Middlehorns, and stunted in their growth from the poverty of their pastures. Of these there are several varieties. The Pembrokeshire are chiefly black, with white horns; are shorter-legged than most other Welsh cattle; are larger than those of Montgomery, and have round and deep carcasses; have a lively look and good eyes; though short and rough, not thick; have not large bones, and possess, perhaps, as much as possible, the opposite qualities of being very fair milkers, with a propensity to fatten. The meat is equal to the Scotch. They will thrive, says Mr. Youatt, where others starve, and they rapidly outstrip most others when they have plenty of good pasture. The Pembroke cow has been called the poor man's cow. The Pembroke ox is a speedy and an honest worker, and when taken from hard work fattens speedily.

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The Glamorganshire *lyons* were once held in great estimation. The counties of *Caerthwen*, Cardigan, Brecon, and especially Radnor, also produce many excellent black cattle, which have been materially improved by the introduction of other breeds, especially by crossing with the Herefords. Of North Wales, the cattle are rather more approaching to the Long-horns than those of the south. The cattle of Anglesea, says Mr. Youatt, are small and black, with moderate bone, deep chest, rather heavy shoulders, enormous dewlap, round barrel, high and spreading haunches, flat face, horns long, almost invariably turning upward; the hair coarse; the hide mellow; hardy, easy to rear, and well disposed to fatten when transplanted to better pastures than those of their native island. The cattle of the other Welsh counties, bred amongst the rocks of Carnarvon, and the hills of Merioneth, Montgomery and Denbigh, have little distinguishing features from other Welsh cattle. They are small, hardy, and rapidly fatten, when of a proper age.

NATIVE SCOTTISH CATTLE.

The West Highlanders, or kyloes, as they are called (supposed to be from a corruption of a Gaelic word pronounced *kael*, signifying Highlands, are, says an early writer, bred in great abundance in, and exported from, the Hebrides. The true bull of this breed is described by Mr. McNeil, of Islay, as black; the head not large, the ears thin, the muzzle fine, and rather turned up; broad in the face; eyes prominent; countenance calm and placid; the horns should taper to a point, neither drooping too much nor rising too high, of a waxy color, widely set at the root; the neck fine, particularly where it joins the head, and rising with a gentle curve from the shoulder; the breast wide, and projecting well before the legs; the shoulders broad at the top, and the chine so full as to leave but little hollow behind them; the girth behind the shoulder deep; the back straight, wide, and flat; the ribs broad, the space between them and the ribs small; the belly not sinking low in the middle, yet, on the whole, not forming the round and barrel-like carcass which some have described; the thigh tapering to the hock-joint; the legs longer in proportion to the size than in the breeds of the southern districts; the tail set on a level with the back; the legs short and straight; the whole carcass covered with a long thick coat of hair, and plenty of hair also about the face and horns, and that hair not

curly. They are hardy, easily fed; the proportion of their offal is not greater than in the most approved larger breeds; they lay their fat and flesh equally on the best parts and when fat the beef is fine-grained and well marked. The illustration is a portrait of one of the modern bred cattle.

THE SHORT-HORNED BREEDS.

The Durham or Teeswater, a composite breed, is the original of the celebrated sub-family now known distinctively as Shorthorns. Here is an example of the misappropriation of a general name to a breed. Their horns are not especially shorter than those of the Jersey and Netherlands cattle.

The Durham and Yorkshire have for ages been celebrated for a breed of cattle possessing extraordinary value as milkers, in which quality, says Mr. Youatt, taken as a breed, they have never been equaled. The cattle so distinguished were always, as now, very different from the improved race. They were generally of large size, thin-skinned, sleek-haired, bad handlers, rather delicate in constitution, coarse in the offal, and strikingly defective in the substance of girth in the fore-quarters. As milkers they were most excellent, but when put to fatten were found slow feeders, producing an inferior quality of meat, not marbled or mixed as to fat and lean; the latter sometimes of a very dark hue. Such, too, were the unimproved Shorthorns of Mr. Youatt's day.

About the year 1750, in the valley of the Tees, commenced that spirit of improvement in the breeders of the old Shorthorns, which has ended in the improved modern breed. These efforts, begun by Sir William Quintin, and carried on by Mr. Milbank of Barmingham, were nearly completed by Mr. Charles Colling.

Besides Mr. Colling, his brother, Mr. Robert Colling, Mr. Charge and Mr. Mason, were hardly second to him in skill and success as breeders of the Shorthorns.

The colors of the improved Shorthorns are red or white, or a mixture of both; "No pure improved Shorthorns," adds Mr. Youatt, "are found of any other color but those above named." That the matured Shorthorns are an admirable grazier's breed of cattle is undoubted: they are not, however, to be disregarded as milkers; but they are inferior, from their fattening qualities, to many others as workers.

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quantity and well laid on beef, the Shorthorn ox is quite full in every valuable part; such as along the back, including the fore-ribs, the sirloin and rump, in the runnels, flanks, buttocks, and twist, and in the neck and brisket as inferior parts. In regard to quality of beef, the fat bears a due and even preponderating proportion to the lean, the fibers of which are fine and well-mixed, and even marbled with fat, and abundantly juicy. The fine, thin, clear bone of the legs and head, with the soft mellow touch of the skin, and the benign aspect of the eye, indicate, in a remarkable degree, the disposition to fatten; while the uniform colors of the skin, red or white, or both, commixed in various degrees, bare, cream-colored skin on the nose and around the eyes, and fine, tapering, white, or light-colored horns mark distinctly the purity of the blood; these points apply equally to the bull, the cow, and the heifer. The external appearance of the Shorthorned breed," adds Mr. Dickson, "is irresistibly attractive. The exquisitely symmetrical form of the body in every position, bedecked with a skin of the richest hues of red, and the richest white approaching to cream, or both colors, so arranged or commixed as to form a beautiful fleck or delicate roan, and possessed of the mellowest touch; supported on clean, small limbs, showing, like those of the race-horse and the greyhound, the union of strength with fineness; and ornamented with a small, lengthy, tapering head, neatly set on a broad, firm, deep neck, and furnished with a small muzzle, wide nostrils, prominent, 'mildly beaming' eyes, thin, large bony ears set near the crown of the head and protected in front with semi-circularly bent, white, or brownish colored, short (hence the name), smooth-pointed horns; all these parts combine to form a symmetrical harmony which has never been surpassed in beauty and sweetness by any other species of the domesticated ox."

AYRSHIRE CATTLE.

Ayrshire has long produced an excellent breed of dairy cattle. The following description of the Old Ayrshire cow is taken from the writings of Mr. Aiton, in his treatise of the dairy breed of cows. The most approved shape, says our authority, is small head, rather long, and narrow at the muzzle; eye small, but smart and lively; the horns small, clear, crooked, and their roots at considerable distance from each other; neck long and slender, taper-

ing toward the head, with no loose skin below; shoulders thin; fore-quarters light; hind-quarters large; back straight, broad behind; the joints rather loose and open; carcass deep, and pelvis capacious and wide over the hips, with round fleshy buttocks; tail long and small; legs small and short, with firm joints; udder capacious, broad, and square, stretching forward, and neither fleshy, low hung, nor loose; the milk-veins are large and prominent; teats short, all pointing outward, and at considerable distance from each other, skin thin and loose; hair soft and woolly; the head, bones, horns, and all parts of least value, small; and the general figure compact and well proportioned.

The qualities of a cow, adds Mr. Aiton in another place, are of great importance. Tameness and docility of temper greatly enhance the value of a milch cow. Some degree of hardiness, a sound constitution, health, and a moderate degree of spirits, are qualities to be wished for in a dairy cow, and what those of Ayrshire generally possess. The most valuable qualities which a dairy cow can possess are that she yields much milk, and that of an oily, butyraceous and caseous nature; and that after she has yielded very large quantities of milk for several years, she shall be as valuable for beef as any other breed of cows known; her fat shall be much more mixed through the whole flesh, and she shall fatten faster than any other.

THE YORKSHIRE COW.

The Yorkshire is as much a Short-horn breed as any other. In Mr. Youatt's time they were generally found in the great dairies in the vicinity of London, and in these the character of the Holderness and the Durham unite, and hence the Yorkshire was a good milch cow, good for the pail as long as she is wanted, and then quickly got into marketable condition.

She should have a long and rather small head; a large-headed cow will seldom fatten or yield much milk. The eye should be bright, yet with a peculiar placidness and quietness of expression; the chaps thin, and the horns small. The neck may be thin toward the head; but it must soon begin to thicken, and especially when it approaches the shoulder. The dewlap should be small; the breast, if not so wide as in some that have an unusual disposition to fatten, yet should be very far from being narrow, and it

should project before the legs; the chine to a certain degree fleshy, and even inclining to fullness; the girth behind the shoulder should be deeper than is usually found in the Shorthorn; the ribs should be spread out wide, so as to give as globular a form as possible to the carcass, and each should project farther than the preceding one, to the very loins. She should be well formed across the hips, and on the rump, and with greater length there than the milker generally possesses, or if a little too short not heavy. If she stands a little long on the legs, it must not be too long. The thighs somewhat thin, with a slight tendency to crookedness or being sickle-hammed behind; the tail thick at the upper part, but tapering below; and she should have a mellow hide, and but little coarse hair. Common consent has given to her large milk-veins.

A large milk-vein is indicative of excellent milking qualities in any breed, since it indicates a strongly developed vascular system, one favorable to secretion generally, and to that of milk amongst the rest. The udder should rather incline to be large in proportion to the size of the animal, but not too large; its skin thin and free from lumps in every part of it, and the teats moderate in size. It is not improbable that the great milking qualities now claimed for some English Short-horns, may be traced to this Yorkshire or Ayrshire branch of the family of Short-horns.

The above, as condensed from Youatt, is valuable as showing the superiority of this valuable strain—as one of the progenitors of the Short-horns of to-day, and especially so as a matter of history.

THE DUTCH, HOLSTEIN, OR DUTCH FRIESIAN CATTLE.

Whatever may be said to the contrary, the Short-horn breeds of cattle owe fully as many of their valuable qualities to the cattle introduced many centuries ago by the Angles, Saxons, Jutes and Friesians, who, uniting together, migrated to England in the fifth century. To make the whole matter plain it is necessary to quote history; from this we get a definite idea of this, among the most ancient of domesticated cattle. This has been collected in a valuable paper by Prof. Hengeveld, of the Netherlands Royal Veterinary Institute, Utrecht, from whom we quote.

He says in a communication to Mr. Charles Mueller, United States Consul at Amsterdam, among

other matters, that, first, the Dutch race of cattle date from an older descent than those of Holstein, while, probably, second, the Holstein cattle originated from the Friesian breed, and from that of the Dutch and Westphalian emigrants. After this colonization, we have our attention directed to another remarkable particular in the history of the Dutch cattle cultivation. From the fourteenth on till the eighteenth century a large number of Danish oxen were annually turned for pasture into the grassy meadows of North Holland, formerly West Friesland, and sold at the weekly North Holland cattle-market. The oldest of these cattle-markets is that of the city of Hoorn. This market was already established in 1311, and, in 1389, the Danes and inhabitants of the Eyder were allowed by Albrecht, Duke of Bavaria, to hold a weekly market there. In 1605, the Danish cattle-market was removed from Hoorn and transferred to Enkhuyzen, where, in 1624, the number of 1,179 oxen were sold. There was also in Amsterdam a lean-cattle market, beginning in the spring, in the month of April, but held at irregular periods, depending upon wind and weather, when cattle were allowed to be conveyed from Denmark and Holstein hither to graze. These were mostly brought by vessel. These importations of Danish and Holstein cattle into North Holland, to which the Herdbook might refer, did not consist of heifers, but of lean oxen, which were pastured on the fertile meadows of the Polders, and afterward sold at the markets of Hoorn, Enkhuyzen, and Amsterdam as fat cattle. As to heifers, either then or now, having been imported from Holstein into Friesland and North Holland for breeding purposes, no such thing is known.

In the work, "Present State of Friesland," it is mentioned that, owing to the cattle plague, the people were compelled to import from abroad all kinds of small cattle, chiefly Danish. But, what was remarkable, however small and ill-favored as these animals might be, when compared with the handsome Friesian horned cattle, as a natural consequence, an improvement of food induced a favorable development of body, and, from the mixture of the two breeds, good and choice milk-kine were attained within two or three generations of the introduction of the foreign blood, no matter how much the race had in the beginning deteriorated through the process, and, eventually, the type of Danish and



DUTCH FRIESIAN BULL, DE WATERGEUS.

German cattle was quite lost. This is, however, more than one hundred years ago.

According to Schmalz's statement, cattle, adopting Strum's classification, may be distinguished in the following manner: A. Lowland race—Primitive cow; Dutch Friesian cow. B. Mountain race—Degenerate; quite the contrary of A; Swiss cow. C. Middle race—Highland race; forms the transition from A to B; Frankish cow. Schmalz says: To the race A belong the Dutch, as representative, the Friesian, the Oldenburg, and chiefly all lowland races, bearing the peculiar characteristics which identify it with the place of its sojourn. This is a purely natural division, and there is not the least arrogance in asserting, what history points out, that the Dutch cattle constitute the type of the oldest, purest and best breed. All other varieties are of less intrinsic value; they are coarser or smaller, possess less productive qualities, though of local excellence in their native places. If cattle of the genuine breed are bought, imported elsewhere, and there bred, why is it not called by its native name, and why must an appellation be given to it quite foreign and unknown to it? One hears in Europe of lowland cattle, but purchases of them for the purpose of improving other breeds have, for the last hundred years, been only made in the chief Netherland provinces, where the choicest cattle of the lowlands are found. Thus, thousands of Dutch and Friesian cattle are annually sent abroad under the name of Dutch cattle. Finally, Dr. George May, director of the agricultural establishment at Weihestephan, who visited Holland about ten years before Prof. Hengeveld wrote, says the Dutch cattle constitute the type of the properly so-called lowland race, which extends throughout Netherlands, Flanders, Normandy, Oldenburg and Denmark. Further on he says: The Oldenburg cattle descend from the Dutch race, and are likewise distinguished as East Friesian cattle, as still partially found in Hanoverian Friesland. In the adjacent parts of Bremen they are called Bremen cattle. The Holstein and Breitenburg cattle in the Wilster and Rempner marshes are equal to them, but with respect to their square build, the Breitenburg cattle are, in their properties, more like the finer Dutch cattle.

CHANNEL ISLANDS CATTLE

The Channel Islands, lying between England and

France, have long been celebrated for cows giving exceedingly rich milk. They are probably of Franco-Germanic origin. Jersey is the largest of the group, and the cattle known to Youatt as Alderneys, are now called Jerseys. The Guernseys are the largest of the Channel Island cattle, and in the west are gaining in favor. Mr. Youatt was prejudiced against these (Alderney) cattle as he knew them, but Mr. Youatt's Alderneys were very different cattle from those imported into the United States. We do not mean the importation of Mr. Nicholas Biddle—these were probably Guernseys—but those of Mr. Roswell Colt, of New Jersey; Mr. Motley, of Massachusetts, and Mr. Taintor, of Connecticut.

JERSEYS FORTY YEARS AGO.

These were of various intermixtures of fawn color, fawn and white, yellow, mouse color, brown, and even almost black, the color darkening with age and the bulls being darker than the cows. The muzzle of these cattle is described by Mr. L. F. Allen, a careful observer, as being fine. The nose is either dark brown or black, and occasionally a yellowish shade, with a peculiar mealy, light colored hair, running up the face into a smoky hue, when it gradually takes the general color of the body; the face, slightly dishing, is clean of flesh, mild and gentle in expression; the eye clear, full, and encircled with a distinct ring the color of the nose; the forehead bold; the horns short, curved inward, waxy in color and with black tips; the ear thin, sizable and quick in movement; the neck is depressed but clean in the throat with only moderate dewlap; shoulders wide and somewhat ragged with prominent points, running down into a delicate arm, and slender beneath. The fore-quarters stand rather close together with a thinnish, yet well developed brisket between. The ribs are flat, yet giving play for good lungs; the back depressed and somewhat hollow; the belly deep and large; hips tolerably wide; rump and tail high; the loin and quarter medium in length; the thigh thin and deep; the twist wide, to accommodate a clean, good sized udder; the flanks medium; the hocks (gambrel joints) crooked; the hind legs small; the udder capacious, square, set well forward and covered with soft, silky hair; the teats fine, standing well apart and nicely tapering and the milk veins prominent.

THE ALDERNEY.

Mr. Youatt describes these cattle as having been in his time small in size and of as bad a form as could possibly be described, the bellies of many of them as being four-fifths of their weight, the neck very thin and hollow, the shoulder standing up and the highest part of the animal. They were hollow and narrow behind the shoulders, the chine nearly without flesh, the hocks narrow and sharp at the ends, the rump short and the brisket narrow and light. Mr. Youatt adds that this form is about as bad as could possibly be described; but yet all these defects are so put together as to make a not unpleasing whole. He admits that they not only give exceedingly rich milk, but fatten in a surprising manner when not in milk. Mr. Youatt, while exaggerating unconsciously the general appearance of the Alderney, as he knew them, nevertheless characterizes the general points of a superior milking cow.

THE GUERNSEY COW.

The Guernsey cow always was larger than either the cow of Alderney or Jersey, and undoubtedly approached nearer to the cow of Normandy, the supposed original of the Channel Islands cattle, than either of the others. As a purely milking breed they have no superiority, but they are probably better grazing cattle than either of the others.

SECTION V.—THE OLD POLLED BREEDS—GALLOWAYS.

These valuable breeds of cattle, as they originally were known, we give descriptions of from various authorities of the time as follows: The Galloways, in the early part of the eighteenth century, were middle-horned and scarcely to be distinguished from the West Highlanders. They were subsequently bred without horns, increased in size, and with a more striking resemblance to their kindred, the Devons, and, it is said, with all their aptitude to fatten, and with a hardness of constitution which the Devons then did not possess.

IMPROVED GALLOWAY CATTLE.

They are described by Youatt as being straight and broad in the back, and nearly level from the head to the tail—round in the ribs and also between the shoulders and the ribs, and the ribs and the loins—broad in the loins, without any large projecting hook-bones—long in the quarters and deep in the chest, but not broad in the ribs and twist. There is much less space between the hook or hip-bones

and the ribs than in most other breeds. They are short in the leg and moderately fine in the shank-bone. The happy medium seems to be preserved in the leg, securing hardihood and disposition to fatten. With the same cleanness and shortness of shank, there is no breed so large and muscular above the knee, while there is more room for the deep, broad and capacious chest. They are clean, not fine and slender, but well proportioned in the neck and chaps; a thin and delicate neck would not correspond with the broad shoulders, deep chest, and close, compact form of the breed. The neck of the Galloway bull is thick even to a fault. The Galloway has a loose, mellow skin, of medium thickness, with long, soft, silky hair. The skin, which is thinner than the Leicester, is not so fine as the improved Durham; it handles soft and kindly. Their color is commonly black, but there are several varieties; the dark-colored are preferred, from their being considered to indicate hardness of constitution.

POLLED ANGUS.

Another valuable breed of polled cows, says Youatt, is bred in Angus, which much resemble in appearance those of Galloway; they are, however, rather larger and longer in the leg, flatter sided, and with thinner shoulders.

SUFFOLK CATTLE.

In Norfolk and Suffolk, says Mr. Youatt, a polled breed of cows prevails which are almost all descended from the Galloway cattle, whose general form they retain, with some of, but not all their excellences; they have been enlarged, but not improved, by a better climate and soil. They are commonly of a red or black color, with a peculiar golden circle around the eye. They are taller than the Galloways, but thinner in the chine, flatter in the ribs, and longer in the legs; rather better milkers; of greater weight when fattened, though not fattening so kindly, and the meat is not quite equal in quality.

THE SUFFOLK DUN.

The Suffolk dun cow, which is also of Galloway descent, is celebrated as a milker, and, there is little doubt, is not inferior to any other breed in the quantity of milk which she yields; this is from six to eight gallons per day. The butter produced, however, is not in proportion to the milk. It is calculated that a Suffolk cow produces annually about 1½ cwt. of butter.

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JERSEY BULL, PEORIA CHIEF.



The Suffolk duns derived the last part of their name from their usual pale yellow color. Many, however, are red, or red and white. They are invariably without horns, and small in size, seldom weighing over 700 lbs. when fattened. The male and female are nearly of the same height, and seldom exceed four and a quarter to four and a half feet. They are rather rough about the head, with large ears. Their bodies are long and legs short, hip-bones high, and generally deficient in the points of the finer breeds. Still many of the cows fatten well, and produce beef of superior quality. In proportion to their size the Suffolk dun cows yield a great abundance of milk; and as a dairy stock there are very few breeds that are preferable.

SECTION VI.—A SUMMING UP OF BRITISH BREEDS.

As giving concisely and connectedly a view of British breeds of cattle as they existed in the latter part of the last century, I condense from London and other authors named, and principally because it throws light on the origin of certain breeds. The authorities given wrote from 80 to 100 years ago. Necessary to remember lest names be confounded.

LONG-HORNS.

The long-horned or Lancashire breed of cattle is distinguished from others by the length of their horns, the thickness and firm texture of their hides, the length and closeness of their hair, the large size of their hoofs, and their coarse, leathery, thick necks; they are likewise deeper in their fore-quarters, and lighter in their hind-quarters, than most other breeds; narrower in their shape, less in point of weight than the Shorthorns, though better weighers in proportion to their size; and though they give considerably less milk, it is said to afford more cream in proportion to its quantity. They are more varied in their color than any of the other breeds; but, whatever the color be, they have in general a white streak along their back, which the breeders term finched, and mostly a white spot on the inside of the hock. (Culley, p. 53.) In a general view this race, notwithstanding the singular efforts that have been made towards its improvement, remains with little alteration; for, except in Leicestershire, none of the sub-varieties (which differ a little in almost every one of those counties where the long-horns prevail) have undergone any radical change or any obvious improvement. The improved breed of Leicestershire is said to have been formed by Web-

ster, of Cauley, near Coventry, in Warwickshire, by means of six cows brought from the banks of the Trent, about the beginning of the eighteenth century, which were crossed with bulls from Westmoreland and Lancashire. Bakewell, of Dishley, in Leicestershire, afterwards got the lead as a breeder, by selecting from the Cauley stock; and the stocks of several other eminent breeders have been traced to the same source. (Marshal's Midland Counties, vol. i., p. 318.)

SHORTHORNS.

The short-horned, sometimes called the Dutch breed, is known by a variety of names, taken from the districts where they form the principal cattle stock, or where most attention has been paid to their improvement; thus different families of this race are distinguished by the names of the Holderness, the Teeswater, the Yorkshire, Durham, Northumberland, and other breeds. The Teeswater breed, a variety of Shorthorns, established on the banks of the Tees, at the head of the vale of York, is at present in the highest estimation, and is alleged to be the true Yorkshire short-horned breed. Bulls and cows from this stock, purchased at most extraordinary prices, are spread over all the north of England, and the border counties of Scotland. The bone, head and neck of these cattle are fine; the hide is very thin; the chine full; the loin broad; the carcass throughout large and well fashioned; and the flesh and fatting quality equal, or perhaps superior, to those of any other large breed. The Shorthorns give a greater quantity of milk than any other cattle; a cow usually yielding twenty-four quarts of milk per day, making three firkins of butter during the grass season; their colors are much varied, but they are generally red and white mixed, or what the breeders call flecked. The heaviest and largest oxen of the short-horned breed, when properly fed, victual the East India ships, as they produce the thickest beef, which, by retaining its juices, is the best adapted for such long voyages. The oxen commonly weigh from 60 to 100 stone (fourteen pounds to the stone); and they have several times been fed to 120, 130, and some particular ones to upwards of 150 stone, the four quarters only. (Culley, p. 48.)

In comparing the breeds of long and short-horned cattle, Culley observes that the long-horns excel in the thickness and firm texture of the hide, in the length and closeness of the hair, in their beef being

finer-grained and more mixed and marbled than that of the Shorthorns, in weighing more in proportion to their size, and in giving richer milk; but they are inferior to the Shorthorns, in giving a less quantity of milk, in weighing less upon the whole, in affording less tallow when killed, in being generally slower feeders, and in being coarser made and more leathery or bullish in the under side of the neck. In few words, says he, the long-horns excel in the hide, hair, and quality of the beef; the Shorthorns in the quantity of beef, tallow and milk. Each breed has long had, and probably may have, its particular advocates; but if we may hazard a conjecture, is it not probable that both kinds may have their particular advantages in different situations? Why not the thick, firm hides, and long, close-set hair, of the one kind, be a protection and security against those impetuous winds and heavy rains to which the west coast of this island is so subject; while the more regular seasons and mild climate upon the east coast are more suitable to the constitution of the Shorthorns.

MIDDLE-HORNS.

The middle-horned breeds comprehend, in like manner, several local varieties, of which the most noted are the Devons, the Sussexes and the Herefords; the last two, according to Culley, being varieties of the first, though of a greater size, the Herefords being the largest. These cattle are the most esteemed of all our breeds for the draught, on account of their activity and hardiness; they do not milk so well as the Shorthorns, but are not deficient in the valuable property of feeding at an early age, when not employed in labor. (Loudon, p. 1016.)

The Devonshire cattle are of a high red color (if any white spots they reckon the breed impure, particularly if those spots run one into another), with a light-dun ring round the eye, and the muzzle of the same color, fine in the bone; clean in the neck; horns of a medium length, bent upwards; thin-faced, and fine in the chops; wide in the hips; a tolerable barrel, but rather flat on the sides; tail small, and set on very high; they are thin-skinned and silky in handling, feed at an early age, or arrive at maturity sooner than most other breeds. (Culley, p. 51.) Another author observes that they are a model for all persons who breed oxen for the yoke. (Parkinson on Live Stock, vol. i., p. 112.) The weight of the cows is usually from thirty to forty stone, and of the oxen from forty to sixty; the

North Devon variety, in particular, from the fineness in the grain of the meat, is held in high estimation in Smithfield. (Dickson's Practical Agriculture, vol. ii., p. 120.)

Lawrence says that the race of red cattle of North Devon and Somerset is doubtless one of our original breeds, and one of those which have preserved most of their primitive form; the excellence of this form for labor is best proved by the fact that the fashionable substitution of horses has made no progress in the district of these cattle, by their high repute as feeders, and for the superior excellence of their beef, which has been acknowledged for ages. They are, he says, the speediest working-oxen in England, and will trot well in harness; in point of strength they stand in the fourth or fifth class. They have a greater resemblance to deer than any other breed of neat cattle. They are rather wide than middle-horned, as they are sometimes called; some, however, have regular middle-horns, that is, neither short nor long, turned upward and backward at the points. As milkers they are so far inferior to both the long and short horns, both in quantity and quality of milk, that they are certainly no objects for the regular dairy, however pleasing and convenient they may be in the private family way.

SUSSEX AND HEREFORDSHIRE CATTLE.

The Sussex and Herefordshire cattle are of a deep red color, with fine hair and very thin hides; neck and head clean, the face usually white; horns neither long nor short, rather turning up at the points; in general they are well made in the hind-quarters, wide across the hips, rump and sirloin, but narrow in the chine, tolerably straight along the back, ribs too flat, thin in the thigh, and bone not large. An ox, six years old, will weigh, when fat, from sixty to one hundred stone, the fore-quarters generally the heaviest; the oxen are mostly worked from three to six years old, sometimes till seven, when they are turned off for feeding. The Hereford cattle are next in size to the Yorkshire Shorthorns; both this and the Gloucester variety are highly eligible as dairy stock, and the females of the Herefords have been found to fatten better at three years old than any other kind of cattle except the spayed buifers of Norfolk. (Marshall's Economy of Gloucestershire.)

POLLED OR HORNLESS BREEDS.

The most numerous and esteemed variety of these is the Galloway breed, so called from the province of



THE CELEBRATED ABERDEEN-ANGUS CATTLE OF SCOTLAND.

that name, in the southwest of Scotland, where they most abound. The true Galloway bullock "is straight and broad on the back, and nearly level from the head to the rump, broad at the loins, not however, with hooked bones, or projecting knobs, so that, when viewed from above, the whole body appears beautifully rounded; he is long in the quarters, but not broad in the twist; he is deep in the chest, short in the leg, and moderately fine in the bone, clean in the chop and in the neck; the head is of a moderate size, with large, rough ears, and full but not prominent eyes, or heavy eyebrows, so that he has a calm though determined look; his well proportioned form is clothed with a loose and mellow skin, adorned with long, soft, glossy hair." The prevailing color is black or dark brindled, and, though they are occasionally found of every color, the dark colors are uniformly preferred, from a belief that they are connected with superior hardness of constitution. The Galloways are rather undersized, not very different from the size of the Devons, but as much less than the long-horns, as the long-horns are less than the short horns. On the best farms the average weight of bullocks three years and a half old, when the greater part of them are driven to the south, has been stated at about forty stone, avoirdupois; and some of them, fattened in England, have been brought to nearly 100 stone.

The general properties of this breed are well known in almost every part of England, as well as in Scotland. They are sometimes sent from their native pastures directly to Smithfield, a distance of four hundred miles, and sold at once to the butcher; and in spring they are often shown in Norfolk, immediately after their arrival, in as good condition as, or even better than, when they began their journey; with full feeding there is perhaps no breed that sooner attains maturity, and their flesh is of the finest quality. Culley, London says, was misinformed about the quantity of milk they yield, which, though rich, is by no means abundant. It is alleged not to be more than seventy or eighty years (early part of the eighteenth century) since the Galloways were all horned, and very much the same in external appearance and character with the breed of black cattle which prevailed over the west of Scotland at that period, and which still abounds in perfection, the largest-sized ones in Argyleshire, and the smaller in the Isle of Skye. The Galloway cattle at the

time alluded to were coupled with some hornless bulls, of a sort which do not seem now to be accurately known, but which were then brought from Cumberland, the effects of which crossing were thought to be the general loss of horns in the former, and the enlargement of their size; the continuance of a hornless sort being kept up by selecting only such for breeding, or perhaps by other means, as by the practice of eradicating with the knife the horns in their very young state.

The Suffolk duns, according to Culley, are nothing more than a variety of the Galloway breed. He supposes them to have originated in the intercourse that has long subsisted between the Scotch drovers of Galloway cattle and the Suffolk and Norfolk graziers who feed them. The Suffolks are chiefly light duns, thus differing from the Galloways, and are considered a very useful kind of little cattle, particularly for the dairy.

From the black polled cattle of Scotland have descended the admirable Aberdeen-Angus, shown in the illustration.

THE AYRSHIRE DAIRY COW.

The Ayrshire breed, according to Aiton, is the most improved breed of cattle to be found in the island; not only for the dairy, in which they have no parallel, under similar soil, climate and relative circumstances, but also in feeding for the shambles. They are in fact, a breed of cows that have, by crossing, coupling, feeding and treatment, been improved and brought to a state of perfection, which fits them, above all others yet known, to answer almost in every diversity of situation, where grain and grasses can be raised to feed them, for the purpose of the dairy, or for fattening them for beef. (Aiton.)

The origin of the Ayrshire breed of cattle is to be found in the indigenous cattle of the county of Ayr, "improved in their size, shape and qualities, chiefly by judicious selection, cross-coupling, feeding and treatment for a long series of time, and with much judgment and attention, by the industrious inhabitants of the county, and principally by those of the district of Cunningham." (Aiton.) The whole dairy breed in the county of Ayr is of mixed white and brown colors.

"The size of the Ayrshire improved dairy cows varies from twenty to forty stones English, according to the quality and abundance of their food. If cattle are too small for the soil, they will soon rise to the

size it can maintain; and the reverse if they are larger than it is calculated to support." (Aiton.)

The shapes most approved of are as follows: "Head small, but rather long and narrow at the muzzle; the eye small, but smart and lively; the horns, small, clear, crooked; and their roots at considerable distance from each other; neck long and slender, tapering toward the head, with no loose skin below; shoulders thin; fore-quarters light; hind-quarters large; back straight, broad behind, the joints rather loose and open; carcass deep, and pelvis capacious and wide over the hips, with round, fleshy buttocks; tail long and small; legs small and short, with firm joints; udder capacious broad and square, stretching forward, and neither fleshy, low hung, nor loose; the milk veins large and prominent; teats short, all pointing outward, and at considerable distance from each other; skin thin and loose; hair soft and woolly; the head, bones, horns and all parts of least value, small; and the general figure compact and well proportioned."

SCOTCH CATTLE.

The cattle of the Highlands of Scotland are divided into a number of local varieties, some of which differ materially from others, probably owing to a difference in the climate and the quality of the herbage, rather than to their being sprung from races originally distinct, or to any great change effected either by selection or by crossing with other breeds. It is only of late that much attention has been paid to their improvement, in any part of this extensive country; and in the northern and central Highlands the cattle are yet, for the most part, in as rude a state, and under management as defective, as they were some centuries ago. These cattle have almost exclusive possession of all that division of Scotland, including the Hebrides, marked off by a line from the Frith of Clyde on the west, to the Murray Frith on the north, and bending toward the east till it approaches in some places very near to the German ocean. Along the eastern coast, north of the Frith of Forth, the Highland cattle are intermixed with various local breeds, of which they have probably been the basis. There are more or less marked distinctions among the cattle of the different Highland counties; and, in common language, we speak of the Inverness-shire, the Banffshire, etc., cattle, as if they were so many separate breeds; but it is only necessary in this place to notice the two more general

varieties, now clearly distinguishable by their form, size and general properties.

The most valuable of these are the cattle of the western Highlands and isles, commonly called the Argyleshire breed, or the breed of the Isle of Skye, one of the islands attached to the county of Argyle. The cattle of the Hebrides are called kyloes, a name which is often applied in the south to all the varieties of the Highland cattle, not as a late writer has imagined, from the district in Ayrshire called Kyle, where very few of them are kept, but from their crossing, in their progress to the south, the kyloes or ferries in the mainland and Western Islands, where these cattle are found in the greatest perfection.

The cattle of Orkney and Zetland are of a most diminutive size; an ox weighing about sixty pounds a quarter, and a cow forty-five pounds. They are of all colors, and their shapes are generally bad; yet they give a quantity of excellent milk; fatten rapidly when put on good pastures; and, in their own districts, are considered strong, hardy, and excellent workers, when well trained to the yoke, and so plentifully fed as to enable them to support labor.

Of the Fifeshire cattle, Culley observes, you would at first imagine them a distinct breed, from their upright white horns, being exceedingly light-lyred and thin-thighed; but I am pretty clear that it is only from their being more nearly allied to the Kyloes, and consequently less of the coarse kind of Shorthorns in them. Notwithstanding this opinion, the cattle of the northeastern counties of Scotland require, for every useful purpose, to be mentioned separately from the Highland herds; and as all of them have a general resemblance, it will only be necessary in this place to notice the Fife cattle in particular. There are various traditions about the origin of this variety. It is said to have been much improved by English cows sent by Henry VII to his daughter, the consort of James IV, who usually resided at the palace of Falkland, in that county; and as there is some resemblance between the cattle of Fife and Cambridgeshire, they are supposed to have been brought originally from the latter county. Others ascribe the origin of the present breed to bulls and cows sent by James VI (James I of England), in payment of the money which his obliging neighbors in Fife are said to have advanced for his equipment when he went to take possession of the English throne.



HIGHLY BREED JERSEY BULL—BREEDING CONDITION.

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The prevailing color of the Fife cattle is black, though sometimes spotted or streaked with white, and some of them are altogether gray. The horns are small, white, generally pretty erect, or at least turned up at the points, bending rather forward, and not widespread like the Lancashire long-horned breed. The bone is small in proportion to the carcass; the limbs, clean, but short; and the skin soft. They are wide between the hook-bones; the ribs narrow, wide set, and having a great curvature. They fatten quickly, and fill up well at the choice points; are hardy, fleet, and travel well, and are excellent for labor, both at plough and cart. A good cow of this breed gives from eighteen to twenty-four quarts of milk per day, yielding from seven to nine pounds of butter, and from ten to twelve pounds of cheese per week (twenty-four ounces to the pound), for some months after calving. (Fife Report, p. 251 and 253.)

The cattle of Aberdeenshire, the largest of which are said to have been produced by crossing with Fife bulls, have been long highly esteemed in the southern markets. It is observed that every succeeding generation of them has increased in size for the last thirty years; and that the native breed has doubled its former weight since the introduction of turnips. (Aberdeenshire Report, p. 468.) The color is commonly black, but there are many of a red and brindle color. They are thinner in the buttock, in proportion to their weight; and deeper in the belly, in proportion to their circumference, than the west Highlanders, and they yield a much larger quantity of milk. Many of them are brought to the south of Scotland, and kept during winter in the straw-yards, for which they suit better than smaller cattle, as they are not so impatient of confinement. The ordinary weight of the middle-sized oxen, at from three to five years old, is from forty to fifty stone; but after being worked for some time, and thoroughly fattened, they have been known to reach double this weight.

WELSH CATTLE.

Of the Welsh cattle there seem to be two distinct kinds. The large sort are of a brown color, with some white on the rump and shoulders, denoting a cross from the long-horns, though in shape not the least resembling them. They are long in the legs, stand high according to their weight, are thin in the thigh, and rather narrow in the chine; their horns are white and turned upwards; they are light in

flesh, and next to the Devons, well formed for the yoke; have very good hoofs, and walk light and nimbly. The other sort are much more valuable; color black, with very little white; of a good useful form, short in the leg, with round deep bodies; the hide is rather thin, with short hair; they have a likely look, and a good eye; and the bones, though not very small, are neither large nor clumsy; and the cows are considered good milkers. (Parkinson on Live Stock, vol. i., p. 135.)

ALDERNEY.

The Alderney cattle are to be met with only about the seats of a few great landholders, where they are kept chiefly for the sake of their milk, which is very rich, though small in quantity. This race is considered, by very competent judges, as too delicate and tender to be propagated to any extent in Great Britain, at least in its northern parts. Their color is mostly yellow or light red, with white or mottled faces; they have short crumpled horns, are small in size, and very ill-shaped; yet they are fine-boned in general, and their beef, though high-colored, is very well flavored. I have seen, says Culley, some very useful cattle bred from a cross between an Alderney cow and a short-horned bull.

To prevent confusion it will be proper here to remark, that the Channel Islands cattle differ very little, one from the other, except in minor points, such as size, color, etc. The cattle of Alderney, although this island originally gave celebrity to the Channel Island cattle, are now in less repute than those of Jersey or Guernsey, probably from the fact that the cattle of these islands have been more carefully bred than those of Alderney. They are all undoubtedly of Normandy origin, and are now divided into two principal sub-families, the Jersey, and Guernsey. On page 219 we have given a portrait of a high caste young Guernsey bull, and here show a portrait of one of the best breeding lines for milk and general excellence.

IRISH CATTLE.

The Irish cattle, Culley thinks, are a mixed breed between the long-horns and the Welsh or Scotch, but more inclined to the long-horns, though of less weight than those in England.

ENGLISH WILD CATTLE.

The wild breed are now found only in the parks of a few great proprietors, who preserve the animals as curious and ornamental, or for the sake of their

high-flavored beef. Those kept at Chillingham Castle, in Northumberland, a seat belonging to the Earl of Tankerville, have been very accurately described in the Northumberland Report, and in Culley's book on live stock, so often quoted. Their color is invariably of a creamy white; muzzle black; the whole of the inside of the ear, and about one-third of the outside, from the tip downward, red; horns white, with black tips, very fine, and bent upwards; some of the bulls have a thin upright mane, about an inch and a half or two inches long. The weight of the oxen is from thirty-five to forty-five stone, and the cows from twenty-five to thirty-five stone the four quarters (fourteen pounds to the stone). The beef is finely marbled, and of excellent flavor. From the nature of their pasture, and the frequent agitation they are put into by the curiosity of strangers, it is scarcely to be expected they should get very fat; yet the six years old oxen are generally very good beef, from which it may be fairly supposed that, in proper situations, they would feed well.

The habits of these animals are entirely wild; at the first appearance of any person they set off in full gallop, and at the distance of about two hundred yards make a wheel round and come boldly up again, tossing their heads in a menacing manner; on a sudden they make a full stop, at the distance of forty or fifty yards, looking wildly at the object of their surprise, but, upon the least motion being made, they all again turn round and fly off with equal speed, but not to the same distance, forming a shorter circle, and again returning with a bolder and more threatening aspect than before; they approach much nearer, probably within thirty yards, when they again make another stand, and again fly off; this they do several times, shortening their distance, and advancing nearer and nearer till they come within such a short distance that most people think it prudent to leave them, not choosing to provoke them farther.

The foregoing description of British herds 100 years ago is largely from "London's Encyclopedia of Agriculture," a work as valuable as it is now rare. The authorities quoted are those the most practical of the last century, and works now rarely met.

OLD ENGLISH JUDGMENT OF CATTLE.

The criteria of excellence in neat cattle are thus given by John Wilkinson, an eminent breeder, in 1820: "The head ought to be rather long, and muzzle fine; the countenance calm and placid, which

indicates a disposition to get fat; the horns fine; the neck light, particularly where it joins the head; the breast wide and projecting well before the legs; the shoulders moderately broad at the top, and the joints well in, and when the animal is in good condition, the chine so full as to leave no hollow behind it; the fore flank well filled up, and the girth behind the shoulders deep; the back straight, wide and flat; the ribs broad, and the space between them and the hips small; the flank full and heavy; the belly well kept in, and not sinking low in the middle, but so formed that a cross section of it would resemble an oval, whose two ends are of the same width, and whose form approaches to that of a circle, or of an ellipsis whose eccentricity is not great (the whole forming, not a round or barrel-like carcass, as some have expressed it, for this would leave a deficiency both in the upper and lower part of the ribs); the hips globular, wide across, and on a level with the back itself; the hind-quarters, that is, from the hips to the extremity of the rump, long and straight; the rump points fat, and coming well up to the tail; the twist wide, and the seam in the middle of it so well filled that the whole may very nearly form a plane perpendicular to the line of the back; the lower part of the thigh small; the tail broad and fat towards the top, but the lower part thin; the legs straight, clean and fine-boned; and when the animal is in high condition, the skin of a rich and silky appearance. These appear to be the most material points for the formation of true symmetry in cattle; there are others of a minor consideration, which will readily be suggested by attention and experience."

The criteria of an ox well adapted to labor differ from the above only in requiring long and strong legs, and broad hardy feet and hoofs.

The criteria of a beautiful cow, according to Wilkinson, is thus expressed:—

She's long in her face, she's fine in her horn,
She'll quickly get fat, without cake or corn,
She's clear in her jaws, and full in her chine,
She's heavy in flank, and wide in her loin.

She's broad in her ribs, and long in her rump,
A straight and flat back, with never a hump;
She's wide in her hips, and calm in her eyes,
She's fine in her shoulders, and thin in her thighs.

She's light in her neck, and small in her tail,
She's wide in her breast, and good at the pail,
She's fine in her bone, and silky of skin,
She's a grazer's without, and a butcher's within.



PORTRAIT OF IMPORTED HEREFORD BULL, GROVE 3D.

Culley's marks of a good cow are these: Wide horns, a thin head and neck, dewlap large, full breast, broad back, large deep belly; the udder capacious, but not too fleshy; the milk-veins prominent, and the bag tending far behind; teats long and large, buttocks broad and fleshy, tail long and pliable, legs proportionable to the size of the carcass, and the joints short. To these outward marks may be added a gentle disposition, a temper free from any vicious trick, and perfectly manageable on every occasion. On the other hand, a cow with a thick head and a short neck, prominent back-bone, slender chest, belly tucked up, small udder or fleshy bag, short teats and thin buttocks, is to be avoided as totally unfit for the purposes either of the dairyman, the suckler, or the grazier. The most valuable, he says, are those which are bred in Yorkshire, Staffordshire and upon the strong lands in other parts of England, and in Ayrshire, Scotland.

SECTION VI.—HOW BREEDS ARE FORMED.

A breed, or sub-family, is formed by the union of two animals, one of which, it is hoped, will supply certain excellences lacking in the other. Thus the bull Hubback imparted to the Shorthorns compactness and good feeding qualities. A careful system of breeding for generations fixed this quality.

The American Merino breed of sheep was formed by the union of two families of Spanish Merinos. Careful breeding and selection, notwithstanding the mistakes committed from time to time, have resulted in fixing certain characteristics, until they now stand the peers of any other fine-wooled breed on earth. It has taken half a century and two generations of men to bring them to their present standard.

FORMING A BREED VS. BREEDING UP.

Experiments in this direction will continue, it is probable, while time lasts. The failures we seldom hear of; the successes are widely heralded. Failure results from many causes; success only from a natural talent for and correct knowledge of the anatomy and physiology of an animal, perfected either by long practical experience, or else by careful study and experiment. It costs time, perseverance, acumen and a long life, to establish a new breed, and generations of successful breeding to perfect it. Hence the ordinary farmer, who expects success in the establishment of a new breed, will meet only failure, unless he gives his life work to it. His legitimate province is the improvement of his common stock,

by means of thoroughbred animals. In this he simply has to study, that he do not make too violent a cross, through seeking a male much too large for his females, or radically different in conformation.

The first cross, however, always brings a superior animal. That is, it will partake more largely of the good qualities of the sire, than of the bad qualities of the dam, and this from the prepotent qualities of the sire. This whole matter will be fully treated of in Chapter VI—Breeding Cattle for Different Uses. The rules will apply in the breeding of all farm stock.

CHAPTER III.

DISTINCTIVE BEEF BREEDS.

SECTION I.—FAVORITE BEEF BREEDS OF THE UNITED STATES AND CANADA.

The two great and distinctive beef breeds of the United States and Canada are the Shorthorns and the Herefords. There are probably more Shorthorns bred than of all other beef breeds put together, and for the reason that they have been in good repute in the United States for nearly a century, and for more than half a century have been favorites in all the great breeding centers. Of late years, or since their general introduction, the Herefords have fairly competed in the great show rings of the country with the Shorthorns.

Next in order, probably, stand the Polled or hornless cattle. Among these the Polled Angus are becoming widely disseminated, the Galloways and Red Polls fairly competing with them as excellent grazing cattle. The West Highland are not adapted to the great grazing districts of the west, and are here spoken of as possibly possessing merits in mountain districts where other breeds will not prove hardy.

Our belief, however, is that the Devons, in all such regions of the country, will prove the more superior cattle, from their ability to take care of themselves under unfavorable conditions of climate or short pasture.

The Galloways and Red Polls are also well known for their active grazing qualities and good flesh, the Galloways especially, on the plains, being said to root away the snow in search of grass, where other cattle will not attempt to feed. On the flush pastures of the west the choice undoubtedly will lie, as it has heretofore done, between the Shorthorns and



PORTRAIT OF SHORT-HORN COW, HOXANNA'S ROSE 2D.

the Herefords, the Polled breeds being sought for special purposes, as, for instance, the Polled Angus, for their admirable feeding qualities and excellence of flesh, and the Galloways and Red Polls for their faculty of getting forage under difficult circumstances. Time alone must decide this. In the hill region of the south, and upon some hilly pastures north, the Devons and their crosses will undoubtedly hold their own. They have so far done so in these localities, and in the south they are better and better liked, year by year.

SECTION II.—SHORTHORNS.

The early maturity, fine grazing qualities, and strong fattening propensities of the Shorthorns will always render them favorites throughout the milder region of the west, and throughout the south where flush pastures are found. At the general farmer—for whom this book is written—may understand something of how to study pedigrees, and understand points in the estimating of cattle, we give instruction for so doing. The cow Roxanna's Rose, for instance, a portrait of which we give, is recorded in the American Herd Book. Do we want to study her full line of ancestors? We find that she is a daughter of 6964 Rose Duke 2d 80904, dam Roxanna's Rose by 7716 Master Rose 86216; tracing through the Miss Renick line (receiving the blood of the old Darlington bull Duke of Noxbee 9920 and Bell Sharon 9507) to imp. Josephine, daughter of Norfolk 2377. The numbers are those of the Shorthorn Herd Book. Under the number 80904 we will find the pedigree of Rose Duke 2d, and so of all the other animals mentioned. Thus her pedigree, or that of any other recorded animal, may be traced step by step to the remotest ancestors.

RATING SHORTHORNS BY POINTS.

In judging any stock the person so judging should fully understand the value of points accepted by the best authorities as standard. That adopted some years ago by the New York State Agricultural Society, is as follows:

THE COW.

PEDIGREE.—Should show unbroken descent on both sides from known animals derived from English herds, as found in the English or American Herd Books, and without this an animal can not compete in this class.

HEAD.—Small, lean and bony, tapering to the muzzle. 3
FACE.—Somewhat long, the fleshy portion of the nose of a light, delicate color. 2
EYE.—Prominent, bright and clear; "prominent" from an accumulation of adipose substance in the socket, indicating a tendency to lay on fat; "bright," as an evidence of good disposition; "clear," as guaranty of good health. 2

HORNS AND EAR.—The horns should be light in substance, waxy in color, and symmetrically set on the head. The ear should be large, thin, and with considerable action. 1

NECK.—Rather short than long, tapering to the head; clean in the throat, and full at its base, thus covering and filling out the points of the shoulders. 2

CHEST.—Broad from point to point of the shoulders, deep from the anterior dorsal vertebra to the floor of the sternum, and both round and full just back of the elbows; or, in other words, "thick through the heart." 11

BASKET.—Deep and projecting, indicating a disposition to lay on fat. 5

SHOULDER.—Here weight, as in the Shorthorn, is an object, should be somewhat upright and of a good width at the points, with the bladebone just sufficiently curved to blend its upper portion smoothly with the crops. 4

CROPS.—Must be full, and level with the shoulders and back. 4

BACK, LOIN AND HIPS.—Should be broad and wide, forming a straight and even line from the neck to the setting on of the tail; the hips, or hucks, round and well covered. 8

RUMPS.—Laid up high, with plenty of flesh on their extremities. 5

PELVIS.—Should be large, indicated by the width of the hips (as already mentioned) and the breadth of the twist. 2

THE TWIST.—Should be so well filled out in its "seam" as to form an even and wide plain between the thighs. 3

THE QUARTERS.—Long, straight and well-developed downward. 4

THE CARCASS.—Round; the ribs nearly circular, and extending well back, and full in proportion to condition. 3

THE FLANKS.—Deep, wide and full in proportion to condition. 3

THE LEGS.—Short, straight, and standing square with the body. 2

THE PLATES.—Of the belly strong, and thus preserving nearly a straight underline. 3

THE UNDER.—Should be pliable and thin in its texture, reaching well forward, roomy behind, tests well apart, and of convenient size. 3

THE TAIL.—Flat and broad at its root, but fine in its cord, and placed high up, and on a level with the rumps. 2

THE COAT.—Should be thick, short and mousy; with longer hair in winter; fine, soft and glossy in summer. 2

THE CARCASS.—Of an animal gives style and beauty; the walk should be square, the step quick, and the seat up. 2

QUALITY.—On this the thriftiness, the feeding properties, the value of the animal depend; and upon the touch of this quality rests, in a good degree, the grazer's and the butcher's judgment. If the "touch" be good, some deficiency of form may be excused; but if it be hard and stiff, nothing can compensate for so unpromising a feature. In raising the skin from the body, between the thumb and finger, it should have a soft, flexible and substantial feel; and when beneath the outspread hand, it should move easily with it, as if resting on a soft, elastic, cellular substance, which, however, becomes firmer as the animal ripens. A thin, papery skin is objectionable, especially in a cold climate. 15

POINTS OF THE SHORTHORN BULL.

In relation to the bull the committee say: Most of the points desirable in the female are generally so in the male, but, of course, should be more masculine in their character, as inseparable from a strong, vigorous constitution. Even a certain degree of coarseness is admissible; but then it must be so exclusively of masculine description as never to be discovered in the females of his get.

In contradistinction to the cow, the head of the bull may be shorter, the frontal bone broader, and the occipital flat and stronger, that it may receive and sustain the horn; and this latter may be excused if a little heavy at the base, if its upward form, its quality and color be right. Neither is the looseness of the skin attached to, and depending from, the under jaw to be deemed other than a feature of the sex, provided it is not extended beyond the bone,

but leaves the gullet and throat clear and free from dewlap.

The upper portion of the neck should be full and muscular, for it is an indication of strength, power and constitution. The spine should be strong, the bones of the loin long and broad, the genital organs large, and the whole muscular system wide and thoroughly developed over his entire frame.

A SUMMARY OF POINTS.

Prof. Brown, of the Ontario College of Agriculture, has summarized the Shorthorn points for the use of the Toronto Live Stock Exhibition, as follows:

MALES.—Head, including ears and horns, 7; neck, 3; fore-quarters, 20; barrel, including loins and crop, 18; legs, including arms and thighs, 5; hind-quarters, including flank and twist, 15; quality (man, skin, loins, tail), 20; carriage, 3; size, according to age, 4; general appearance, 5. Total points, 100.

FEMALES.—Head, 5; neck, 3; fore-quarters, 18; barrel, 18; legs, 3; hind-quarters, 20; quality, 12; size, 5; udder and veins, 8; cuticle and skin, 5; general appearance, 3. Total points, 100.

SECTION III.—HEREFORDS.

The modern Hereford is one of the most massive, even and majestic of any of the popular breeds of cattle. Perfectly quiet and tractable, admirable in their grazing qualities, in early maturity second to none, carrying excellent flesh largely distributed in the prime parts, and fattening to weights second to none of the larger beef breeds, it is not strange that they should quickly make their way and permanently hold their place at the front in all the great grazing districts of the United States and Canada. As showing their admirable quality we give a portrait of Grove 8d, one of the later importations of famous English Herefords. His breeding is as follows: Calved Nov. 5th, 1874; his herd book number is (5051). Sire, Horace (3877), dam by Sir Thomas (2228). The herd book containing the number (5051) will give the breeding by which the bull may be traced and so of any other animal sought. Knowing the name and recorded number the pedigree and that of any ancestor, may be traced consecutively as stated under Shorthorns.

The scale of points given for Shorthorns will also serve not only for Herefords in a general way in connection with the characteristics heretofore given, but must serve also for all the other beef breeds presented. Comparatively few farmers wish to study points critically as a special breeder would. The matter given will serve sufficiently well to fix the salient points in the mind. The study of the particular animal will be the important one in breed-

ing grades. If pure or thoroughbred cattle are intended to be bred, the money invested in works treating specially of the breed proposed to be undertaken, will be well placed as auxiliary to what we here give.

SECTION IV.—POLLED CATTLE.

The Aberdeen-Angus or Polled Angus, as they are also called, are perhaps the most widely known of any of the polled breeds in the United States. All that will be necessary here will be a brief description of the several breeds. Where they may perhaps become especially valuable has already been stated. As between the Polled Angus and Galloway it has been authoritatively stated that the breeds are alike in that they are both Scotch breeds, both black in color, and both hornless. The points of difference are: The Galloways are coarser boned and heavier haired than their Aberdeen-Angus rivals, and the latter breed matures earlier than the Galloways, and are generally finer. The portrait group, page 202, shows individuals of Aberdeen-Angus of the highest possible excellence.

GALLOWAY VS. POLLED ANGUS.

As a foundation cross for plains cattle, Mr. J. H. Sanders, in a letter from England, gives his impressions as follows:

"I am rather disposed to question the desirability of the Galloway as a cross for our western ranchmen. Hardy they undoubtedly are, and of most admirable form in carcass; but I have a fear that this cross upon the foundation stock in use on our western plains will be found coarse-boned and slow in reaching maturity. I venture this as an opinion based entirely upon the prevailing type of these cattle as I have seen them in their native country. When mature I am inclined to think they are superior in shape of carcass, judged from a beef producing standpoint, to their rivals, the finer-boned, finer-haired, and earlier-maturing Aberdeen-Angus; but as a cross for the purposes above indicated I certainly look for much more satisfactory results from the latter breed, unless it be upon herds that have already been improved by several crosses with the earlier maturing breeds."

ANGUS AND TEXAN CROSS.

Yet we must recollect that no cattle can reach early maturity that are obliged to subsist upon the dried up grasses of the plains in winter, comparatively rich though these grasses are. The fact of the wel-

known hardness of the Galloways, and their ability to forage for themselves, will in our opinion count for more than early maturity, always produced by high and artificial breeding, and the sturdy frames of the Galloways should nick more kindly with the semi-wild Texans and other modified, relative breeds of the plains and mountain valleys of the far West.

My own impression is, as previously stated, that the Galloway will be found valuable in regions where cattle must of necessity forage largely for themselves. We doubt the advantage, for instance, of crossing the hornless, early-maturing, highly bred Aberdeen-Angus upon Texans with a view of inducing early maturity and fineness of bone. The same rule will apply to all highly bred animals. Early maturity and great fineness of bone, do not and cannot belong to animals that must shirk for themselves and withstand the inclemencies of the plains' winters, while feeding upon the dry grasses of those regions. All the finer breeds of cattle have been made by careful care and shelter combined with high feeding. We should look for better success on the plains, in Texas, New Mexico, and the mountain valley regions of the west through the use of animals well bred, but not combining excessively early maturity and delicately fine points. These are the animals natural to fat pastures and superior winter feeding and care.

CHAPTER IV.

DISTINCTIVE MILK BREEDS.

SECTION I.—CHARACTERISTICS OF MILKING BREEDS.

The characteristics of all cattle noted for large quantities of milk are, fine heads and horns; thin necks; a wedge-shaped body, lighter before than behind, rather than a rounded or square form; large udders; great milk veins; and a prominent and large band of up-growing hair extending along the back part of the udder well up to the root of the tail and even encompassing the vulva. Aside from this each breed has its special characteristics, which may be fully recognized in the head, horns, and general appearance, while all breeds conform to the general rule as stated.

SECTION II.—CHANNEL ISLANDS CATTLE.

These are now generally comprised under two distinctive breeds: The Jersey and the Guernseys, named respectively from the islands of those names. The Jerseys are smaller and more delicate, the

Guernseys larger and more shapely from a beef-making standpoint; but both excel in the excessive richness of their milk.

THE JERSEY COW.

Whether the Jersey will ever become a favorite cow for the general farmer is problematical. She is essentially a cow for butter, the milk being essentially rich in cream. For the butter maker who has facilities for high feeding and the perfect manufacture of butter, the Jersey is the superior of any other cow. Where cheese is the object, or both butter and cheese, other breeds will supply the place of the Jersey. Especially where the carcasses of the young stock are to be converted into beef will this be as a rule indicated. For the family requiring rich milk and superior butter, the wealthy individual who can afford to keep a herd that will be an ornament to his lawn or meadow, the Jersey will always find a place. The American Jersey Cattle Club consider form and points so essential that a scale of points was adopted embracing thirty-four single points as perfection in cows and heifers and thirty-three single points for bulls. These points for cows are as follows:

HEAD.—Small, fine and tapering.

CHEEK.—Small.

THROAT.—Clean.

MUZZLE.—Fine, and encircled by a bright color.

NOSTRILS.—High and open.

HORNS.—Smooth, crumpled, not too thick at the base and tapering.

EARS.—Small and thin; and of a deep orange color within.

EYE.—Full and placid.

NECK.—Straight, fine, and placed lightly on the shoulders.

CHEST.—Broad and deep.

BARREL.—Hooped, broad and deep; well ribbed home, having but little space between the last rib and the hip.

BACK.—Straight from the withers to the top of the hip; straight also, from the top of the hip to the setting on of the tail.

TAIL.—At right angles to the back; the tail fine; and hanging down to the hocks.

HIDE.—Thin and movable, but not too loose; hide covered with soft, fine hair; hide of good color.

FORE-LEGS.—Short, straight and fine.



JERSEY COW, NANCY LEE AND CALF.

FORE-ARMS.—Swelling and full above the knee.

HIND-QUARTERS.—From the hock to the point of the rump well filled up.

HIND-LEGS.—Short and straight (below the hocks) and bones rather fine; squarely placed, not too close together when viewed from behind; and not to be crossed in walking.

HOOFS.—Small.

UPPER.—Full in form; well in line with the belly; udder well up behind.

TEATS.—Large, squarely placed; behind, wide apart.

MILK-VEINS.—Very prominent.

GROWTH, GENERAL APPEARANCE AND CONDITION.—These count as one point each. The ears count two points each, barrel two points, back two points, tail two points, hide three points, hind-legs three points, udder two points.

Twenty-nine points are necessary to a prize in cows, and twenty-six are required for heifers. But a heifer will be considered perfect at thirty-one points, since their udder (two points) and milk-veins (one point) cannot be fully developed.

In bulls one point is given for pedigree on the male side and one for pedigree on the female side, otherwise the points do not vary, except as to masculinity.

GUERNSEY COWS.

The Guernseys are larger than the cattle of the other Channel Islands, smoother in their build, but with the same general characteristics. The Guernsey is more quiet in temper than the Jersey, their teats are of a good size and hence milk easily. It is claimed that the Guernseys have been bred for over a hundred years with reference to distinctive breeding. In 1789 it is said a law was enacted forbidding the importation of any animal for breeding purposes into the island of Guernsey. As we have seen them they are certainly distinct from the Jerseys, and should not be classed with them at fairs. They are generally of broken colors, yellow and orange-yellow and white predominating in the United States. Their skin is exceeding yellow and the butter of a very deep color. They stand exposure well, and will weigh when fat 1,200 pounds and over, and certainly are worthy of extended trial for the dairy.

As to differences between the two breeds, a Guernsey fancier describes them as follows:

"The Jerseys are darker, more gray and dun colored, with streaks and points of black, and light, crumpled, and black-tipped horns. The Guernseys are larger; are orange and fawn colored, with bars of red; have straighter backs and horns; are not so hollow before the hips, and are hardier and richer looking animals. They have not the delicate, diminutive appearance of the Jerseys, and are not a pony breed. They have plenty of bone and muscle; their udders are larger, and the milk-veins more prominent. Aside from these differences, the two breeds closely resemble each other in appearance, and have long been indiscriminately and inaccurately classed together as Alderneys."

The following description of an excellent representation of the breed will convey a correct idea of a fine Guernsey cow:

"She has the long, slim head, fine and tapering nose, high and open nostrils; clean, straight throat, with a small dewlap; smooth horns; broad and deep chest; barrel round and deep in the flank; short front legs, stout and well muscled in the fore-arm, trim and shapely in the lower arm; has squarely-placed, wide-set hind legs, giving plenty of room for the udder; and with small, trim hoofs. Her udder reaches well up behind, is evenly in line with the belly; the teats are smooth, wide apart, and squarely placed. She has an almost uniform orange color, deepening in the slim, shapely ears; a rather loose, mellow hide, with soft, fine hair; and large and gentle eyes."

The illustration of Guernsey bull Sir Champion will give a correct idea of a superior bull of this breed and the cut of the Jersey bull, Peoria Chief, will show the characteristics and differences between the Jerseys and Guernseys.

SECTION III.—AYRSHIRE CATTLE.

The Ayrshire, a composite English breed, has been known in Scotland for more than a hundred years as a superior race of milking cattle and as fattening kindly when dry; as models of what a good dairy cow should be they may be taken as the type. The perfect dairy cow is thus described by Dr. Sturtevant, formerly of Massachusetts, but now connected with Cornell University, N. Y. As Dr. Sturtevant was an admirer and large owner of Ayrshires, and a gentleman who had given the physiology of milking stock particular and scientific study, while the description will apply especially to the Ayrshire, it will

also apply measurably to all other milking cattle and especially to Shorthorns and Dutch cattle, these all having probably been originally derived from the same ancestry. Hence the general characteristics will apply to all dairy cows. The statement is as follows:

The usefulness of any dairy cow is in her udder, and toward the udder, its shape and its yield, all the capabilities of the cow should be directed. Viewed as a reservoir for the milk, it must be large and capacious, with broad foundations, extending well behind and well forward, with distant attachments; broad and square, viewed from behind; below level and broad; the lobes even-sized, and teats evenly distributed; the whole udder firmly attached, with skin loose and elastic. The glands should be free from lumps of fat and muscle, well set up in the body when the cow is dry, and loosely covered with the soft and elastic skin, without trace of flabbiness. Such a covering allows for extension when the animal is in milk, while the glands are kept in proximity with the blood-vessels that supply them.

THE LACTEAL GLANDS.

The necessities of the lacteal glands are larger supplies of blood from which milk can be secreted, and this harmonizes with the demands of the udder as a store-house. For broad attachments means broad belly or abundance of space for the digestive organs, from which all nutriment must originate. The blood is furnished to the glands of the udder by large and numerous arteries. As secretion is dependent on the freedom of supply of blood to the part, and a copious flow, we find branches coming from different arterial trunks and freely anastomosing with each other. Although these arteries are internal and out of sight, yet fortunately the veins which carry the blood from the udder pass along the surface and from their size and other characteristics indicate not only the quantity of blood which they carry away, but which must have passed through the glands from the arteries. These return veins pass both backward and forward. Those passing forward are known as the milk veins, and the size of these superficial veins on either side of the belly, and the size of the orifices into which they disappear, are excellent points to determine the milking probability of the cow. Still better is it to find, in addition, the veins in the perineum, which also return to the udder, promi-

nent and circuitous. The escutcheon is now generally conceded to be a good indication of milk in the cow. I think the broad escutcheon is full as good a sign as a long one; that quantity or quality means more than shape, yet I will not discard the shape entirely. One error must, however, be avoided. It may be well to compare the size of escutcheon of cows of one breed, but never to compare the size of escutcheon in cows of different breeds. I think this point means more relative to size in the Ayrshire than in the Holstein or Dutch; and I am certain that, while it may be safe to follow it in the Ayrshire in the majority of instances, it would be equally unsafe to adopt it in selecting a Shorthorn, for the obvious reason that that breed has been bred for generations for other purposes than the dairy.

The udder and its dependencies, the milk vein and the escutcheon mark, may be considered the foundation of the Ayrshire cow. These notably influence profit, as they also do the shape of the body and the form of the animal. The milk vessel is placed in the pubic region of the cow, and is protected on either side by the hind limbs. The breadth of its attachments secures breadth of the body, and the weight requires also a depth of quarter and of flanks. The breadth below requires breadth of hip above, and length of bone here appears related to length of pelvis. So much for the physical portion. The physiological functions of milk-producing demand a great and continuous flow of blood, for it must not be forgotten that milk is blood, so to speak. This flow is dependent on the supply of food, and on the facilities of digestion. To gain this a large body is required in order to hold the suitable digestive organs. To gain further room for these, we desire to see arched ribs, depth, yet no heaviness of flank, and the breadth of hips which we see was also required for the broad udder. To sustain this body, a strong, firm back is needed. To gain the most of our blood after it has absorbed the chyle from the digestive organs, reason shows that it should find its way freely and speedily through the system on its labors of supply and removal, cleanse itself in the lungs, and again pass on to its duties. All this points to a healthy heart, not cramped, and lungs of sufficient capacity; for the yield of milk drains much nutriment from the system, and the constitution must needs have the vigor given by healthy and active heart and lungs. In this way, then, the chest is correlated with the udder. The re-

productive functions require hook bones of good size, and a broad pelvis is desirable, as underlying which are the generative organs. Thus the necessities of a good milking cow require the wedge shape, and this not only from the flank, but also when it is viewed from above.

DAIRY POINTS.

To sum up the points of a good dairy cow, we should find the whole fore-quarters thin in front, and gradually increasing in depth and width backward, yet being of sufficient breadth and roundness to insure constitution. The back should be straight, the loins wide, the hips high and well spread; pelvis roomy, long, broad and straight, hook bones wide apart; quarters long, tolerably muscular, and full in their upper portions, but molding into the thighs below, which should have a degree of flatness, thus affording more space for a full udder; the flanks well let down, but not heavy; ribs, behind, springing out very round and full, affording space for a large udder—the whole carcass thus acquiring increased volume toward its posterior portion. The points as given are those of utility, and we see the udder points and body points are correlated. In connection with the body and the udder, the skin is of great value in assisting our judgment. Between that portion of the external covering used for leather and the muscle, there occurs a layer of cellular tissue, which contains a larger or smaller amount of fat cells, and the mellow handling caused by these cells indicates a free circulation throughout the meshwork.

The skin varies from a thin, papery hide, covered with silky hair, to a thick, supple, elastic hide, well coated with hair, on the one hand, and a similar variation, with harsh hair and coarseness on the other. The thin, papery hide indicates quick fattening and a delicate constitution; the thick, elastic hide cushioned on fat, and which, on the flank, comes into the hand almost without grasping, indicates the height of vigor, accompanied by the fattening tendency, and the possessor of this handling endures climatic changes, low quality in his food, and neglect, with remarkable hardihood, and quickly responds to full feed and good care. The harsh handler is a dull feeder, consumes much food, and generally contains more than a just proportion of offal or waste.

In the Ayrshire cow we desire neither of these extremes, for it is in the milk product that we wish the food to be utilized, and it is almost an unchanging law of nature that deficiency in one direction must be compensated for by excess in another direction, and vice versa. At any rate, the cow that lays on fat too quickly is seldom a first-class milker, and how well known it is that the cow of large yield milks down her condition. A cow that has a moderately thin, loose skin, of sufficient elasticity and suppleness of touch, without being fat-cushioned, as it were, with hair soft and mossy, or woolly, if of correct form otherwise, will usually milk a large quantity, and when she becomes dry, will rapidly come into condition. In truth, the handling of the Ayrshire cow must be good, it cannot be too good; but it must not be of exactly that quality sought for in the grazing breeds. There, as everywhere, the dairyman must keep to his line; milk, not fat, is his profit; and in seeking excess of both, he will be liable to fall below the average of either.

It is an axiom of breeders to diminish the useless parts of an animal as much as possible; or, in other words, to reduce the proportion of those parts not conducive to profit to as great extent as possible. Applying this rule to a dairy breed, we should desire a small neck, sharp shoulders, small brisket and small bone. Moreover, small bone usually accompanies thrift, and is universally found in improved breeds.

Let us now look still further for other points, which are here quoted: Shoulders lying snugly to the body, thin at their tops, small at their points, not long in the blade, nor loaded with muscle; brisket light; neck of medium length, clean in the throat, very light throughout, and tapering to the head; tail long and slender; legs short, bones fine, joints firm. If the dairyman's policy were otherwise, he would have to supply extra food for the supports of parts useless to him, and whose larger development is of no especial value. The head should be small, in shape either long and narrow, or broad in the forehead and short, according to the type of the animal preferred by the breeder, generally preferred somewhat dishing; the nose tapering to an expanded muzzle, with good, clean nostrils.

Opinions differ as to the general shape of the head. A broad forehead and short face occurs more frequently in bulls, and is generally esteemed

a masculine characteristic; a more elongated face is called feminine. Yet some families of well-bred and good milking Ayrshire cows have the broad and short head, and such were, at one time, if not now, the favorites of the show-yards in Scotland.

The eye should be moderately full, lively yet placid-looking. The eye is the mirror of the disposition, and interprets the character of the cow; a fretful, irritable animal is seldom a quick fattener, and usually disappoints at the pail. It also gives expression to the features, and physiognomy aids our judgment. The ears should be of a good size, but thin, and their skin of a rich yellow color. Coarse ears are usually found on ill-bred animals, and thus may be considered, to a certain extent, indicative of general coarseness. The color of the skin, as shown inside the ear, is usually considered indicative of the richness of the milk in butter.

The horns should be of medium size, of fine texture, with an outward and upward turn, or inclining upward and turning slightly inward, according to the taste of the breeder. They should be set on rather widely apart. A coarse horn may indicate a coarse and thick hide, as there seems an intimate relation between the composition of the horn, hair and hide; and the influence of climate on the horn and hair gives an apparent oftentimes of correlation between the two.

The neck should be of medium length, very light throughout, and tapering to the throat, which should be free from loose, hanging skin. Yet a too thin neck is not desirable, as it usually indicates a delicate animal. A thick-set neck, well covered, yet not overlaid with muscle, accompanies hardness and vigor of constitution.

The junction of the neck with the body and over the shoulders is called the crops; on a horse it would be called the withers. A hollow behind this point is a never-failing sign of weakness. The crops should blend in easily with a thin shoulder, lying snugly to the body. This shoulder and a well-defined spine produce the sharpness of shoulder so much admired.

The back should be straight, with spine well-defined, especially forward. The tail long, firm in the bone, and set on a level with the back, without depression or notch. A fine tail usually accompanies fine bone, and fine bone is not only decrease of offal over heavy limbs, but accompanies early

maturity and a tendency to thrift. The limbs should be fine in the bone, flat rather than round below the knee, and with joints of moderate size. On the forward limbs the cow should stand low. The teats should be of medium length, evenly set, and project slightly outward when the bag is full, be of even thickness throughout, and of fine texture.

AYRSHIRE COLORS.

The colors of the Ayrshire are brown-red and white, or yellow and white. Black spots on the skin, barely perceptible through the hair, often occur on the best cattle. Strawberry-blotched and red and white are the most common colors, though these extend from brown to almost pure white.

SECTION IV.—DUTCH CATTLE (HOLSTEIN, FRIESIAN, ETC.)

We have already given something of the history of these admirable milking cattle, whose frames are kindly fattened when not in milk. They are therefore the dairy cattle of the west, especially where cheese is an object, but they also produce butter in large quantities and of high excellence. These or the Ayrshires we do not hesitate to say will eventually hold the front rank in the great dairy districts of the west, the probability lying altogether in favor of the Dutch cattle. There are no cattle that can compare with them in the enormous quantity of milk yielded daily. We have seen two three-weeks-old calves fully satisfy themselves from a cow of this breed, and then have seen milked an ordinary-sized milk pail, half full of milk afterward. Particular cows will yield ninety pounds of milk per day, and fifty pounds of milk per day is not an unusual yield. These cattle also hold out in their milk flow for long periods, and from this race Guenon named his best milk-mirror—the Flanders. The cut shows the milk-mirror or escutcheon.

SELECTION FOR MILK.

In Holland the experts select a cow with reference to her feeding qualities and for her general make up as a milk-producer. Charles L. Flint, Esq., when visiting the great International Exhibition at Hamburg about a quarter of a century ago, gave the characteristics.

"The principles on which they practice, in selecting a cow to breed from, are as follows: She should have, they say, considerable size, not less than four and a half or five feet girth, with a length of body corresponding; legs proportionately short; a finely formed head, with a forehead or face somewhat con-

NETHERLANDS OR HOLSTEIN COW, SHOWING MILK-MIRROR BEHIND.



cave; clear, large, mild, and sparkling eyes, yet with no expression of wildness; tolerably large and stout ears, standing out from the head; fine, well-curved horns; a rather short than long, thick, broad neck, well set against the chest and withers; the front part of the chest and the shoulders must be broad and fleshy; the low-hanging dewlap must be soft to the touch; the back and loins must be properly projected, somewhat broad, the bones not too sharp, but well covered with flesh; the animal should have long, curved ribs, which form a broad breastbone; the body must be round and deep, but not sunken into a hanging belly; the rump must not be uneven; the hip-bones should not stand out too broad and spreading, but all the parts should be level and well filled up; a fine tail, set moderately high up, and tolerably long, but slender, with a thick, bushy tuft of hair at the end, hanging down below the hocks; the legs must be short and low, but strong in the bony structure; the knees broad, with flexible joints; the muscles and sinews must be firm and sound; the hoofs broad and flat, and the position of the legs natural, not too close and crowded; the hide, covered with fine glossy hair, must be soft and mellow to the touch, and set loose upon the body. A large, rather long, white and loose udder, extending well back, with four long teats, serves, also, as a characteristic mark of a good milch cow. Large and prominent milk veins must extend from the navel back to the udder; the belly of a good milch cow should not be too deep and hanging."

DUTCH OR HOLSTEIN COLORS.

Dutch cattle are always a combination of pure black and pure white, and with a yellow skin under the white hair. However these colors may vary in relative blending and quantities, no other color is admissible.

SECTION V.—OTHER MILK BREEDS.

While we have given the characteristics of the several distinctive milking breeds of cattle that have been fairly disseminated in America, it must not be forgotten that the principal European countries, and many local districts have breeds famous for their milking qualities. The Galloways and red Polls are so in Scotland; the Welsh cattle have noted milking families; the Kerry cattle of the Irish hills have long been celebrated as milkers; the Swiss cattle and those of Normandy are especially celebrated in their respective localities, and in the United States

local milking families have acquired local celebrity. These have generally had a Shorthorn origin, as the cream-pot breed of New York, and the Patton breed of the west. The principal excellence of the older local breeds celebrated for milk may, however, be distinctly traced to the Galloway, Dutch, Ayrshire, Yorkshire and the earlier importations of Shorthorns. In New England the Devons will be found with a marked predominance among dairy cattle. The New England red cattle, admirable for the yoke, have produced many excellent milkers. It would, however, be folly for the farmer of to-day to revert to those as milking stock. If a foundation stock is to be used upon which to rear milkers from improved bulls of milking strains, we should advise the mixed stock of Shorthorn blood, or good cows containing largely of "seventeen" (Durham) blood or others of the lower-priced Shorthorn families. They originally were milkers, and a cross of Netherlands or Ayrshire blood would give fine dairy cattle. If very rich milk is desired we should advise the use of a Guernsey bull. The progeny would give good milkers and fair messes of rich milk, and the steers of these and especially the Ayrshire and Netherlands (Holstein and Dutch-Friesian) cross would furnish in the steers especially large and good beef cattle.

CHAPTER V.

BREEDS COMBINING LABOR, BEEF AND MILK.

SECTION I.—THE QUESTION OF MIXED QUALITIES.

While we do not advocate the endeavor to combine too many qualities in the same animal, it should be admitted that the farmer must be actuated by different motives from that of the breeder for special purposes. The farmer must have cattle that when the cows are dry they will make good carcasses of beef. It is necessary that the steers be capable of being turned off to feeders, or better that they be fattened on the farm to good weights.

In some sections of the country the labor of the steers is yet an important integer. Here crosses of Dutch cattle would certainly be indicated, since they are faithful, docile and strong at the yoke. The Dutch cattle will yet be found to combine as many qualities as can be desired, in one animal, except, perhaps, the Devons and their near relatives—the Sussex. Unfortunately the Devons in the United States have been so long bred exclusively for beef, that their originally good milking qualities have

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GUERNSEY BULL, SIR CHAMPION. (Now Dead.)



been well nigh bred out, as has been the case with the Shorthorns, except in particular families. We give the characteristics, therefore, of some breeds, more from the latent goodness that remains, rather than for what they now contain. The real place of the Devons is, as previously stated, rather in a hill and mountain region than upon the flush pastures of a country of good arable land.

SECTION II.—DEVON CATTLE.

The Devons, as bred now, are divided into two separate classes. One small, high-strung, of great activity, traveling at a walk but little inferior to that of the horse, and when required will easily reach a speed of five or six miles an hour. They are now comparatively rare, found mostly east of the Alleghenies, and in some of the hill regions of the south. In the west the larger and sturdier class are preferred, but retaining the same general characteristics as to style, activity and high carriage. As beef cattle, and as working cattle, the Devons are unexcelled, and have profitably modified the common cattle of every section of the country most favorably. As purely milking cattle they are not to be recommended, though particular strains have given fair milkers, and the milk, like the eggs of game fowls, is of the highest quality. Their beef is especially fine, being muscular and well-marbled, but the oxen should be at least four years old, and from this to five or six years, before their full excellence is attained. There is no doubt but that on hill and other short pasture more may be obtained, per acre grazed, than from any of the larger breeds. Hence the favorable consideration they are there held in. In fact, to-day their beef sells in the Smithfield, England, market, at a higher price than that of any other, except the Scottish (Highland) breeds.

SECTION III.—SUSSEX CATTLE.

The Sussex is a close relation of the Devon, being derived from the same original source. The cows can hardly be recommended for dairy purposes, but their increased size, the excellence of their beef and their good qualities at the yoke, have always gained them admirers in England, and of late years they have attracted especial attention in America as beef-makers. It has been said of them, enlarge the Devon, make him a trifle coarser, with stronger horn, and thicker, harsher hide, preserving, perhaps, all his good qualities, and you have a fair description of a Sussex steer.

The cows have the reputation of being unquiet at pasture, but when hardiness is required, we think them superior in the west to the Devons. The illustration on page 193 gives an admirable likeness of one of the best of this breed, and except that the Sussex are larger and heavier, will serve to illustrate the Devons.

SECTION IV.—POLLED CATTLE AS MILKERS.

The Galloways are fair milking cattle. They are good beef-makers, and thrive where the Shorthorns and Herefords would seriously shrink in flesh. They are abundantly able to take care of themselves wherever they are kept, and they are fair working cattle. They are, however, not dairy cattle in the strict acceptance of the term. The other polled cattle are as distinctively beef-makers and not milkers, as the Shorthorns or Herefords.

The red polls, however, are of late attracting considerable interest in the west. They are not dairy cattle, but the average of them give fair messes of milk, and the milk, like that of the Devon, is rich in cream and yellow in color. In size they are larger than the Devon, or about the size of the Sussex. The illustration is given to show a first-class cow of this breed and one with good indications for milk.

SECTION V.—A SUMMARY.

To summarize the whole matter of breeds, it is only necessary to repeat: Know what you breed for. If you want beef, do not try to get great beef points and superior excellence in milk mixed up in one animal. It was never yet compassed, never will be. The superior beef animal is square, or should be. There is an appearance often of heaviness in front. The superior milch cow is wedge-shaped. There is an appearance of lightness in shoulder and bosom, and a corresponding enlargement behind. There is also a sharpness of outline not found in the beef maker. The point of the shoulder will be sharp rather than full, and along the back (spine) behind the withers, there will be cups (depressions) well known to careful observers, and particularly evident in the Holsteins or Dutch Friesians. The dairy cow is longer in the face than the cow inclined to make flesh. There is greater capacity of the udder, and the thighs, although deep, are flat rather than round.

In the case of cattle noted for their ability to pull a load, or to travel on the road, as in the Devons, for instance, there is a roundness of outline rather

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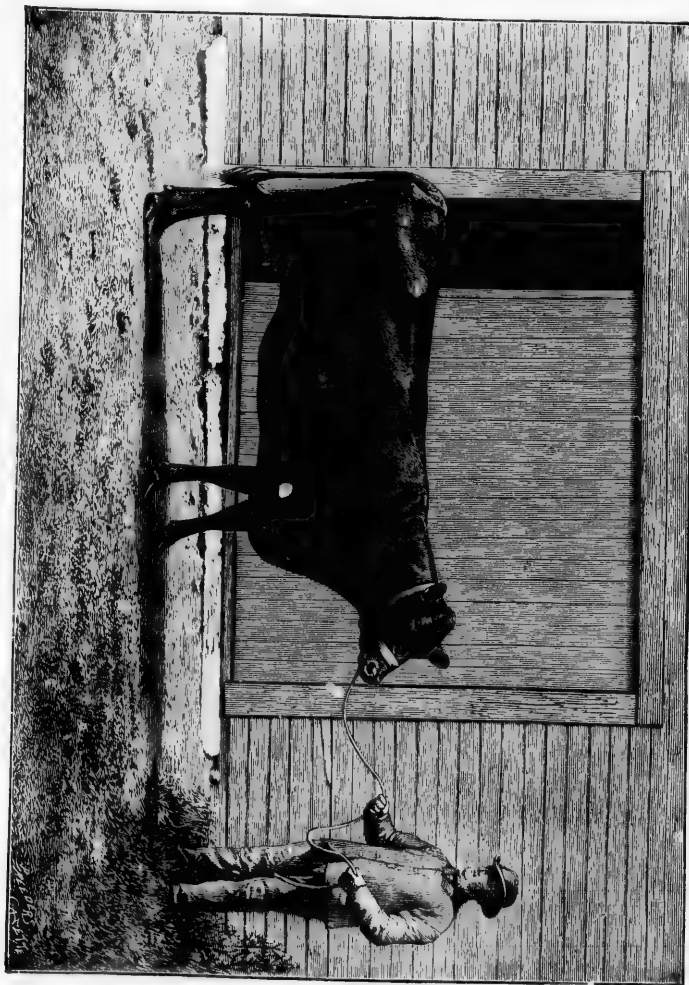
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RED POOLED HEIFER, LIX IV.



than squareness. The withers, or rather the top of the shoulder, which corresponds to the withers in the horse, is high; the shoulders are oblique; the head is carried high, and there is a general appearance of activity not found either in the animal eminent for flesh, or in one adapted for milk. Nevertheless, the ox well adapted to work, is by no means ill suited to the production of beef. On the contrary, such cattle produce beef of the highest quality, that is, excellent lean flesh, well marbled with fat, but are slow in maturing, as is well known to be the case with the Devon, and especially with the Scotch (Highland) cattle, but which, nevertheless, bring the highest price in the London (Smithfield) market, where beef is sold upon its merits.

But in the breeding of cattle for flesh, the farmer is actuated by different motives from that of the specialist who breeds distinctively for flesh, or distinctively for milk. The farmer wants a cow good at the pail, and also cattle that the steers will be available for beef. This being admitted, he must seek them in those families of Shorthorns noted for milk, in the Ayrshires, and in the Holstein or Dutch Friesian. These will any of them give satisfaction as sires when both milk and beef is the object.

CHAPTER VI.

BREEDING CATTLE FOR DEFINITE USES.

SECTION I.—THE TRUE AIM IN BREEDING.

One of the most constant and costly mistakes made by those who enter the domain of breeding, as a distinct branch of husbandry, is the supposition that the improvement of animals lies more in chance than in well-digested effort. Chance never produced a permanent improvement in anything, much less in stock breeding, where so much depends, not only upon the physical qualities of the animals paired, but upon the vigor and constitutional characteristics of ancestors.

PREPOTENCY.

The reason why a superior blooded male imparts his breed characteristics strongly upon his progeny when bred to the common mixed stock of the country is, he has descended for generations from animals uniting superior and definite qualifications. On the other hand, the dams have been bred without a fixed purpose or idea, generally from sires as inferior as the dams, and in the case of, cattle never twice to

a superior bull; often from yearling "scabs," whom their owners were too indolent to geld. In the case of persons who have really sought to improve their stock it is the exception, and not the rule, that the superior cows of the herd are selected to be served by a pedigreed bull of known excellence, and excelling in those points or characteristics in which the females are deficient, as in early maturity, beef-making characteristics, qualities for producing milk rich in cheese or butter or both.

As a rule, the breeder is apt to consider the grade bull of his neighbor good enough. It is a mistake. The grade bull is certainly better than the bull of no particular blood, and yet he may be the exact reverse of what is wanted.

SECTION II.—A COMPARISON IN BREEDING.

Let us see where the two systems of using a grade sire and a thoroughbred sire will land the breeder in ten years. Farmer A buys a thoroughbred bull two years old, for which he pays, say \$300. This will buy a bull fully good enough to breed to the very best cows of mixed blood, whether the bull be Shorthorn, Hereford, Holstein or Jersey. Two hundred dollars will usually buy a first-class bull of anything except the high-caste pedigree sorts. The resulting calves will contain half the blood of the sire and half the blood of the dams. They will be half-blood grades.

THE BREEDING AGE.

At two years old the heifers may be bred, and the next year (the fourth year from the start) we again get a progeny containing half the blood of the sire and half the blood of the dam; or one-half plus one-fourth pure=three-quarters blood, the dam being a half-breed, contributing one-half of one-half=one-fourth of the pure blood. We now have three-quarters bred grades.

When these heifer calves are two years old they are again bred to a pure bull. The next year (the seventh from beginning) we have seven-eighths blood grades, as a study of the previous figures will show. When these heifers are two years old they are again bred, and preferably, unless there are strong reason for changing the bull, to the same sire used from the first.

HIGH GRADES.

The progeny will contain fifteen-sixteenths of pure blood as against one-sixteenth of mixed blood, and

the ten years will have brought you a herd so select that the best of them will show fully up to pure blooded animals except under the examination of the most critical judges.

The three-quarters and seven-eighths bloods will be quite as valuable for feeding purposes, or for milk and butter as the average of pure bloods, but not uniformly so.

STARTING WITH A GRADE BULL.

Farmer B thinks a half-blood bull good enough for him. Let us follow him for ten years. At one year he gets one-quarter grades, that is half the blood of the sire, one-half of one-half pure blood, equal to one-fourth, and one-half of the blood of the dam. Simply one-fourth blood, just one-half as pure as the thoroughbred bull's progeny. The next generation gives one-fourth plus one-eighth, equal to three-eighths; the next generation one-fourth plus three-sixteenths, equal to seven-sixteenths, and the next generation one fourth plus seven-thirty-seconds, equal to eleven-thirty-seconds, or equal only to one-thirty-second part better than one-third bred. In other words, Farmer B has not so good stock at the end of ten years as Farmer A had at the end of the first year's breeding. Now the longer he continues in this line the worse off is he relatively, yet far better off than those neighbors who believed altogether in scrub blood.

SECTION III.—GOOD BREEDING FROM A CASH BASIS.

It will not be necessary to follow Farmer B further. Let us see how Farmer A comes out. He buys a bull for \$200. He has ten select cows, of the common mixed breeds of the country, worth \$30 each, value \$300; one bull value \$200; an investment of \$500. At the end of the first year he has ten calves, five of them heifers. They are worth five dollars more than common calves, and when matured will sell for ten dollars more each. The second year he has ten calves and ten yearlings. The third year he has ten calves, ten yearlings, and ten two-year olds. He now breeds fifteen females to his bull; the fourth year twenty; the fifth year twenty-five; the sixth year thirty-five, five of them calves of the first calves. The seventh year he has fifty cows and heifers to breed.

He now should buy another bull to serve particular animals, for fifty cows, unless under exceptional circumstances, are enough for one bull. He will

also have had ten steers, worth an advance over common stock in any market, of \$400. His heifers are worth the same advance (really double), but say \$400. Here is a clear gain through the \$200 original investment on the bull, and he still capable of paying for himself before the expiration of the ten years.

INCREASING PROFITS.

The calves and two and three year old heifers on hand at the end of the tenth year, highly bred as they are, may safely be said to be worth an average of \$75 each. The farmer will find himself with a herd, the admiration of his friends and the envy of the advocate of scrub bulls. Is it strange that really good sires command high prices? No! There are enough sagacious breeders—always will be—who understand the value of superior blood.

SECTION IV.—BREEDING PURE CATTLE.

Suppose the individual at the time of buying his bull had additional capital to buy three or four thoroughbred cows to start a herd, selecting such animals as would "nick" (breed well) together. Suppose four cows were bought, in calf; the average of bulls and heifers as progeny, is about equal for a series of years. On this basis, at the end of one year, the owner would have two bulls to sell and two yearling heifers to raise. At the end of the second year he could sell two bulls, and his herd would consist of eight females, old and young. The third year his herd would be twelve females, the two heifers of the first having bred meanwhile.

A PROFITABLE INCREASE.

Regularly thereafter his herd would yearly increase by an additional two females, and as the progeny of the two heifers were of breeding age, proportionally faster. Ten years would see him with a large herd. The sale of the bulls, and some heifers not up to a high breeding mark, would pay the expense of keeping.

COMMON SENSE PRACTICE.

There is no theory about this; scores of the most valuable herds of the country have started in just this way. It is simply a question of a first investment, and, whether the foundation be one or more cows, it is a safe and practical outlay, especially if the owner have a herd of ordinary cows, to still further supplement the service of the bull.

SECTION V.—PRACTICAL STUDY OF PRINCIPLES.

No man should undertake any new industry without due preparation. No man ever made the best success in the breeding of common stock at random, much less can he hope for success in breeding fine stock without proper system. It is not enough that he be a good, that is liberal, feeder. It is not enough that he be a good general farmer. He cannot even be this without study and careful thought. He must acquire a knowledge of points; must be able to recognize superior stock by their appearance, handling (the feeling of touch); must be able to detect good points from bad ones, and ought to be able to prescribe for and administer to an animal in ordinary sickness and disability.

DECISIONS ON IMPORTANT QUESTIONS.

The breeder must be able to decide why, or why not a certain bull or cow should be bred together, or why a certain bull will be apt to nick with a majority of his herd; and an animal not doing so, on trial, he must have decision sufficient to discontinue this line of breeding. Another thing he must disabuse himself of, that in-and-in breeding, the breeding of close relations, is not injurious. It will be one of the practical uses of this work to bring facts together, and assert as facts what close reading of facts have substantiated. If any one wish to pursue these back to their origin, the literature on the subject is wide enough to give an abundance of study.

SECTION VI.—CLIMATE AND BREEDING.

Climate must be considered in the selection of a breed. The uses for which animals are intended must also be given careful thought. The Devon and Sussex are best adapted to hilly or broken regions. They also stand cold better than other breeds of improved cattle. The Herefords probably stand next in hardiness, and are equal to any good grazing cattle.

SOME FACTS AND COMPARISONS.

Shorthorns have the earliest maturity. No cattle attain greater weight or have stronger powers of assimilation. They are capable of making a favorable impress upon whatever mixed breeds they are used upon, and south of forty degrees are undoubtedly the best cattle for the general farmer to breed from when beef is the commodity intended. South of the Ohio river they are in large majority, and hold their pre-eminence up to the latitude of St. Louis

and Indianapolis. North of these points the Herefords fairly compete the palm of excellence with them. Still farther north the Herefords are the favorite cattle. Speaking from our individual standpoint, we think the Herefords the peers of any cattle for beef up to latitude forty-three degrees. As far north as Minnesota, in regions of flush pasture, Shorthorns and Herefords contest the meed of superiority in the hands of their respective breeders.

LIMITS OF SUCCESSFUL BREEDING OF SHORTHORNS AND HEREFORDS.

The scope of country embracing the State of Tennessee on the south, and the northern line of Illinois on the north, may be considered the limits for the most profitable breeding of Shorthorns and Herefords. The pastures are flush, the winters not especially severe even in the northern district, and the region lies within that best for successful corn growing.

THE DAIRY REGION OF THE UNITED STATES.

North of a line cutting through Central Ohio, Indiana, Illinois, and west, lies the great dairy region of the United States. Here the milking strains of the Shorthorn race compete with the beef-making Shorthorns, Herefords, Devons, Sussex, Galloways, Angus and other beef breeds, and the distinctive milking breeds, the Jersey and Guernsey, for butter making, and the Holstein and Dutch Friesian as the two principal varieties of the Dutch breeds are named by their respective fanciers. That noble English breed, the Ayrshire, also find here their most congenial home in their capacity for butter and cheese-producing milk. Here the proposing breeder need not go astray in the selection of stock once he has mastered the capabilities of the several breeds for the purposes intended through a careful study of points and qualifications as laid down in this work.

SECTION VII.—BAKEWELL'S RULES FOR BREEDING.

That eminent breeder of England, who became celebrated for his wonderful success in improving the long-horned English race of cattle to great perfection in a comparatively short time, and whose name is also identified for distinctive success in improving the Leicester sheep, is credited with certain rules as his guide in breeding. They have been called

BAKEWELL'S TEN RULES.

Our version is as follows:

First.—The eye and judgment must be correctly

trained in the anatomy and physiology of the several animal parts.

Second.—The several parts, one to the other, must be in correlation; that is, there must be a reciprocal relation, conforming to a certain fixed standard.

Third.—The selection and breeding together of animals must be toward the development of the most valuable characteristics or qualities, according to the use for which the animals are intended.

Fourth.—Selection of breeding animals must especially embrace qualities inducing correct form, symmetry, eminent feeding qualities and vigor of constitution.

Fifth.—The food must be such as to insure the best development of the animal, thus inducing early maturity, and this from a well-known law of heredity.

Sixth.—Shelter and warmth (equable and mild temperature) Bakewell held to be indispensably necessary to the best development.

Seventh.—Variety of food, and this in accordance with the age of the animal, Bakewell asserts to be indispensable.

It will be seen that rules five, six and seven are really but divisions of one primary rule.

Eighth.—The strain (peculiarities) of blood once established never depart from; that is, never take a distinct cross outside. Why? Constancy in a line of breeding gives prepotency.

Ninth.—Perfect regularity in all that pertains to feeding and stable management must be strictly adhered to.

Tenth.—The inheritance of courage, combined with docility, tractability and absolute dependence upon the will of the master is only attained by kindness and careful training.

To this we add that firmness in the trainer is one of the essentials of kindness, and especially so in connection with training. It must never be mistaken for harshness.

A careful analysis of these rules will show any reader of the best works on breeding that they are founded not only on correct judgment, but that the original mind of Bakewell easily grasped them at a time when the rule of blind force was the predominant one in the common mind, as it is generally to day. Until the reverse came to be accepted by the few there was no permanent improvement in the

training of animals. Until the law of correlation came to be accepted there was no permanent and distinctive improvement in breeds.

A SPECIAL STUDY.

From what we have given, the reader will have seen that the breeding of live stock cannot be successful from any hap-hazard standpoint. The breeder, in fact, must make as careful a study of the breed he intends to devote his attention to as would any business man of his special occupation. For this reason the farmer should undertake but one breed of a species; or in the breeding of grades he should confine himself to one line of crossing. That is to say, in cattle the farmer should not use a Short-horn bull on his herd two or three years and then change to Hereford, Polled Angus or other beef breeds. If milk is the object stick to one particular milk breed after a careful study has allowed a decision to be formed of the relative value.

The question of climate will also need special consideration, for hardness and the ability to withstand climatic changes here becomes a matter of the first consideration. Observation will go a great way in deciding this. A fairly correct opinion may be formed by inspecting the nearest herds of the breeds contemplated.

CHAPTER VII.

FEEDING AS CONNECTED WITH BREEDING.

SECTION I.—ABOUT DIGESTION.

In order that we may form a correct idea of the value of food we must understand the process of digestion. We have already stated something of this in the horse. In the horse and hog the stomach receives the food and the real process of digestion commences at once. All this class of animals as a rule thoroughly grind (chew) their food before it enters the stomach. (See Page 246.)

The domesticated birds, as well as others, swallow their food whole; it enters the crop, where it is softened. From thence it passes to the gizzard, where it is ground by means of pebbles and other hard substances swallowed, after which it is finally digested. Hence we see the necessity of a thorough grinding of the food before being swallowed.

THE OFFICE OF THE SALIVA.

But simple grinding of the food is not sufficient. In this act, saliva is profusely poured out, the food

being not only thoroughly softened thereby, but the saliva acts as a kind of ferment one of the preparatory acts to digestion. Now digestion is not entirely carried on in the stomach. Digestion is simply the conversion of food into blood, through which it is given off to nourish every part of the animal system, producing growth in young animals, and in older ones the accumulation of flesh and fat.

Now since the animal is used simply as a machine to convert grain, grass, hay and other fodder into a more concentrated and valuable form, and since we have seen that thorough grinding is one of the necessary, in fact indispensable, preparations to complete digestion, we see at once the value of assisting the animal in this respect, by cutting and grinding, and in the case of hogs, cooking the food.

The only question in this connection for the farmer to determine, is, Will grinding or cooking pay? This depends entirely upon the relative value of the food and the flesh. It will pay to grind grain for animals when corn is over forty cents per bushel. It will pay to cook food for hogs when corn is over fifty cents per bushel. In fact, in the final fattening of swine, it will pay to grind and cook food, whatever the price of corn; for the fattening process may thus be carried much farther than when fed grain without this preparation. It will also be seen that a large amount of fluid must be given, since only those parts soluble in the fluids of the body (pure water, in connection with the solids held, saliva, for instance, being ninety-nine and one-third parts water in one hundred), is taken up and assimilated.

SECTION II.—THE NECESSITY OF STRONG FEEDING.

By strong feeding we do not mean stuffing. Strong feeding is simply providing full feeding of nutritious substances. A pasture of mixed grasses constitutes a perfect food. In summer, animals on lush pasture fatten fast, and, for the reason that the weather is mild, grass is easily digested and animals consume a larger quantity of the food. The best feeders, however, allow also some grain daily, even on pasture, to produce the best results in growth. If the animal is being fattened to ripeness, this additional food is economically necessary. That is, it pays.

Why? The animal is simply a machine for converting grass and grain into flesh. A certain portion of the food consumed is required to supply the daily

animal waste. All else that can be digested adds to the ultimate value of the animal.

If you simply feed enough to supply the animal waste you lose the whole value of the food fed, unless the animal is earning something at labor. If so little is fed that the animal loses flesh from day to day, you lose not only the value of the food given, but also the value of that given by which this daily shrinkage was originally built up.

But the food given may be such only as lays on fat. In this case there is waste, since there must be flesh forming food required as well as heat forming food. On the other hand, if the food contains too much nitrogenous matter, there is still greater waste, since the nitrogenous elements are the most costly in agriculture. The young animal requires more bone and flesh forming elements than the fully grown animal, and unless given in large proportion there is lack of growth. There is, however, the danger of great loss from over-feeding, for here all that cannot be perfectly digested is passed off and lost.

The true science of feeding, therefore, is to feed constantly just up to the full capacity of the animal's digestive powers, when fattening, feeding for flesh, or feeding for milk is the object.

SECTION III.—THE FEEDING OF BREEDING STOCK.

In the feeding of breeding stock high feeding is not necessary, but no animal can fully meet the proper requirements unless it is in full flesh—a very different thing from being fat. A well-conditioned horse, for instance, is in full flesh. He may have comparatively little fat. With a breeding animal the case will be different. Full condition here would be represented by a considerable degree of fatness; far more than in that of the horse used for fast driving; fully as much fat as that carried by the horse used for draft.

The breeding animal must have the perfect food required for growing animals. That is, such food as contains all the elements of growth. This is found in wheat, rye, barley and oats, and less so in Indian corn; but sufficiently so for all practical purposes if fed with rations of grass or good hay.

Corn fodder, bright and well cured, is one of the most valuable of our forage crops, for winter feeding. Corn fodder grown thickly, as for hay, if cured in the best manner, is rated as 91, when good meadow hay stands at 100; bright oat straw would stand at about 69, theoretically, and bright wheat straw some-

thing less. Hungarian grass would be rated at 104, and timothy and clover at 109. In other words, 100 pounds of hay being rated at 100 cents, the other substances would be rated in cents per 100 pounds as stated. But stock would starve to death on straw alone. They gain very slowly on Hungarian, clover, or meadow hay, and also on corn stalks, even when only the leaves are eaten. Hence, the grain supply must be in proportion to the rough forage used.

In fattening, only enough rough forage should be given to keep the stomach properly distended. Unless this accompaniment of concentrated food is used, loss is sustained, and this must be in accordance with the digestive powers of the animals in question. Hence, in breeding animals, none but those with large feeding capacity, strong digestive organs, and great powers of assimilation should be employed, for upon these animals depend the integrity, as flesh formers, of the progeny. It will be found to be one of the most important of the practical questions with which the farmer has to deal.

SECTION IV.—FEEDING OF FATTENING STOCK.

The feeding of stock for fattening requires different treatment from that of breeding or growing stock. The object here—the animal having been brought to its full condition of flesh—is to increase the accumulation of fat to such degree as to give the flesh its full succulence. In the best animals the fat is fully distributed throughout the muscular fiber. To do this rest is required, and the accumulation of fat about the kidneys, intestines, and other fatty portions of the animal, must take place largely. It is true that this fat of animals is the least valuable portion as human food; but it is necessary, and the feeder must suffer this comparative loss in order that the flesh may be brought fully up to the highest selling point. It is the province of the practical feeder to decide this point.

Animals fattened to that excessive degree, as now exhibited at our fat stock shows, at six or seven years of age, never give the feeder profit, from the consumer's standpoint. These lessons are, however, valuable from the breeder's standpoint, and this is a practical one, as showing the great and continued powers of assimilation of the animals thus treated; and hence it is an instructive one.

THE FEEDER'S ART.

This must be simply to supply the daily animal waste, and accumulate fat. To realize the greatest

result in crops the soil must be supplied with all the elements of growth, and far in excess of the required necessities of the crops. So with the excessive fattening of animals. Hence, the loss—what is not assimilated by the animal is passed off in the excrement—and the nitrogenous elements more largely than the fatty elements. Indian corn meal, linseed cake, cotton seed meal, molasses and other foods of a like nature are largely employed. The feeder for practical use, depends, in the west, largely upon Indian corn, ground, with other grains, in the last fattening process, as being the cheapest. In this, as in all other practical questions connected with stock, the individual must be guided by the cost of food and the price of the ripened animal.

SECTION V.—FEEDING FROM CALFHOOD.

No person ever yet made money by letting an animal lose in winter a large percentage of what it had gained in the summer. This we have fully shown. But there is a difference between feeding fully and stuffing. The precocious animals shown at one and two years of age grossly fat, and of extraordinary weights, are not to be taken as standards of excellence in feeding. They are often standards of excellence simply in stuffing. Nevertheless, while this is true, one may learn, as heretofore stated, good lessons from such feeding.

One of these lessons is: The average gain in feeding animals is constantly decreasing from youth until they are killed. This is best shown by comparative tables from actual experience, as exhibited at our fat stock shows. As illustrating this, we give several tables showing ages of different classes, weights, and average gain in weights, in pounds and decimals of a pound, per day, from birth. A comparison will show more than could be contained in many pages of descriptive print. They are from the official reports of Illinois.

SHORTHORNS.—Steer or Spayed Heifer 3 and under 4 years.

No.	Name of Animal.	Age in days, Nov 1 to 1882.	Weight Nov 15, 1882.	Average gain per day in pounds since birth.
1	King of the West.....	1,305	2,535	1.94
2	Dwight.....	1,299	2,060	1.58
3	Ohio 1st.....	1,316	1,840	1.40
4	Ohio 2d.....	1,322	1,916	1.44
5	Corporal.....	1,434	2,300	1.62
	Average.....	1,339	2,141	1.59



GROUP OF HIGH CASTE SHORT-HORNS.

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Steer or Spayed Heifer 1 and under 2 years.

No.	Name of Animal.	Age in days, Nov. 15, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
6	Cassius 5th.	381	1,140	2.97
7	Cassius 4th.	412	1,105	2.94
8	Clarence Kirklevington.	415	1,620	3.51
Average.		400	1,288	3.72

Cow, 3 years old or over.

No.	Name of Animal.	Age in days, Nov. 15, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
9	Rosa Bell.	1,589	1,800	1.13
10	Miami of Redwood.	2,171	1,699	0.77
11	Lady Garfield.	1,421	1,485	1.01
12	Acorn 4th.	1,101	1,865	1.32
13	Royal Charming 6th.	2,456	2,035	1.00
14	Lily Dale 2d.	2,496	1,780	0.73
15	Bentley's Maid.	3,818	2,100	0.55
16	4th Princess of Thorndale.	1,791	1,510	0.81
Average.		2,106	1,808	0.85

HEREFORDS.—Steer or Spayed Heifer, 3 and under 4 years.

No.	Name of Animal.	Age in days, Nov. 15, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
17	Sir Richard.	1,121	1,765	1.57

Steer or Spayed Heifer 2 and under 3 years.

No.	Name of Animal.	Age in days, Nov. 15, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
18	Wabash.	1,077	1,940	1.80
19	Excelsior, 4720.	1,032	1,630	1.58
20	Hortie.	755	1,910	1.74
Average.		954	1,626	1.70

Steer or Spayed Heifer 1 and under 2 years.

No.	Name of Animal.	Age in days, Nov. 15, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
21	My Maryland 4721.	697	1,330	1.90

Cows 3 years old or over.

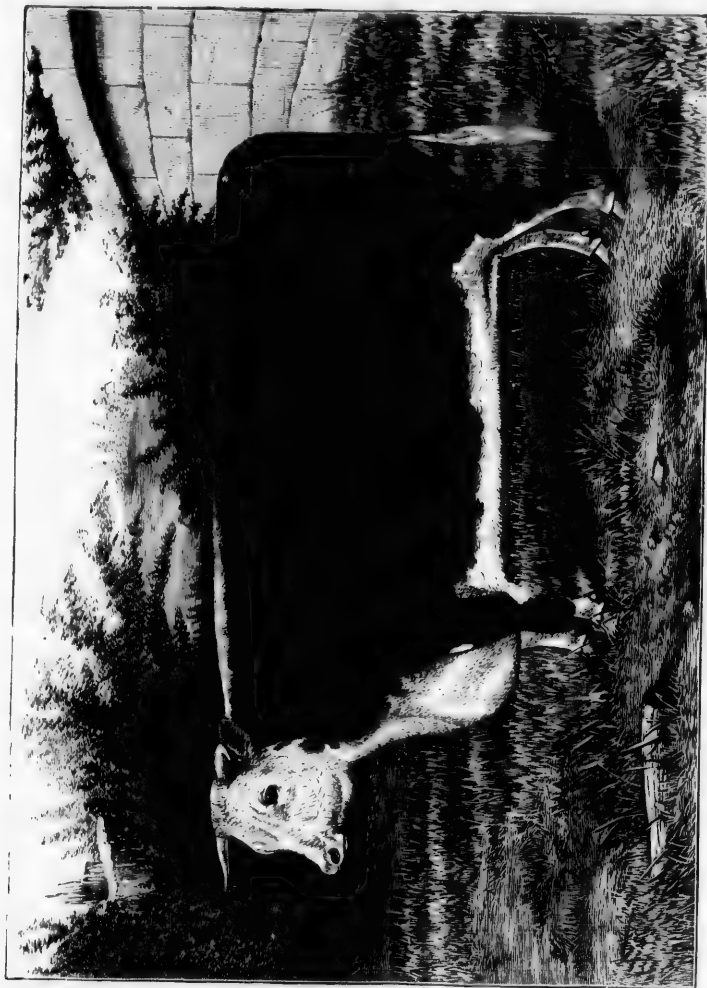
No.	Name of Animal.	Age in days, Nov. 15, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
22	Bright Spot.	1,818	1,545	0.85
23	Princess Alice Maud, 1029.	3,943	1,800	0.45
Average.		2,880	1,672	0.65

GRADES OR CROSSES.—Steer or Spayed Heifer, 3 and under 4 years.

No.	Name of Animal.	Breed.	Age in days, Nov. 15, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
24	Broad Horns.	Grade Hereford.	1,248	1,620	1.30
25	Jones.	"	1,110	1,805	1.62
26	Canadian Cham.	Grade Shorthorn.	1,305	2,400	1.90
27	Diamond.	Grade Hereford.	1,355	1,990	1.46
28	Pythias.	"	1,378	1,870	1.35
29	Thad. Stevens 2d.	Grade Shorthorn.	1,390	2,115	1.63
30	Lorina.	"	1,401	2,065	1.47
31	Tom Brown.	"	1,171	1,915	1.65
32	Sherman.	"	1,218	2,135	1.75
33	Spot Face.	Grade Hereford.	1,415	1,815	1.39
34	Duke.	"	1,239	1,865	1.50
35	Diamond.	"	1,236	1,950	1.58
36	Wild Indian.	Grade Shorthorn.	1,314	2,045	1.55
37	Comet.	"	1,185	2,080	1.75
38	Cluncher.	"	1,308	2,105	1.53
39	Chance.	"	1,156	2,100	1.87
40	Storm.	"	1,279	2,040	1.61
41	Garfield.	"	1,279	2,065	1.61
42	Arctur.	"	1,348	2,235	1.79
43	John Sherman.	"	1,368	2,250	1.84
44	Cash.	"	1,187	2,100	1.77
45	Chub.	"	1,170	2,045	1.75
46	Neb. Morris.	"	1,065	1,965	1.81
47	Major.	"	2,034	2,034	1.61
Average.			2,034	2,034	1.61

Steer or Spayed Heifer, 2 and under 3 years.

No.	Name of Animal.	Breed.	Age in days, Nov. 15, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
48	Jim Blaine.	Grade Shorthorn.	933	1,825	1.96
49	Sandy.	"	941	1,655	1.76
50	Jay.	"	972	1,735	1.78
51	Jerry.	"	904	1,750	1.76
52	Young Aberdeen.	"	902	1,745	1.93
53	Grimell.	"	1,011	1,850	1.83
54	Col. Scott.	"	1,034	1,905	1.84
55	Bennett.	"	1,080	1,785	1.65
56	Harry West.	"	776	1,385	2.04
57	Boat Boy.	Grade Hereford.	1,050	1,650	1.57
58	Mammoth.	Grade Shorthorn.	954	2,220	2.59
59	Jesse.	"	949	1,700	1.80
60	Baldwin.	"	934	1,745	1.86
61	Tip Top.	"	887	1,595	1.80
62	Conqueror II.	Grade Hereford	866	1,705	1.97
63	Beecher.	"	949	1,815	1.88
64	Highland Lad.	"	972	1,680	1.73
65	Wallace.	"	978	1,720	1.75
66	King William.	"	970	1,655	1.71
Average.			951	1,753	1.85



PORTRAIT OF FAT HEREFORD HEIFER.

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Steer or Spayed Heifer, 1 and under 2 years.

No.	Name of Animal.	Breed.	Age in days, Nov. 1st, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
67	Benton's Ch'mp'n.	Grade Hereford.	574	1,410	2.45
68	Squire	"	501	1,250	2.23
69	Curly Jim	"	509	1,225	2.17
70	Ohio	"	632	1,325	2.04
71	Mason	"	615	1,150	1.92
72	Red Major	Grade Shorthorn.	715	1,600	2.23
73	Experiment	Grade Shorthorn.	775	1,025	2.16
74	Drift	Grade Shorthorn.	920	1,300	2.24
75	White Hack	Grade Hereford.	720	1,175	2.05
76	Champion of Iowa	Grade Shorthorn.	715	1,055	2.31
77	T. Eastman	"	682	1,130	2.10
78	Walzel	"	451	1,230	2.70
79	J. Adams	"	519	1,210	2.20
80	Conover	"	523	1,270	2.12
81	Sir Thomas	Grade Hereford.	714	1,300	1.93
82	St. Paul	"	549	1,232	2.24
83	Eighty-one	"	524	1,155	2.20
Average			600	1,318	2.20

Cow, 3 years old or over.

No.	Name of Animal.	Breed.	Age in days, Nov. 1st, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
84	Ohio Belle	Grade Shorthorn.	1,636	1,815	1.11
85	Nellie	"	2,450	1,905	0.97
86	Lady Peerless	"	1,611	1,800	1.14
Average			1,773	1,806	1.07

SWEEPSTAKES RING 3.—Steer or Spayed Heifer, 3 and under 4 years.

No.	Name of Animal.	Breed.	Age in days, Nov. 1st, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
25	Jones	Grade Hereford.	1,110	1,805	1.62
27	Damon	"	1,355	1,990	1.46
28	Pythias	"	1,378	1,870	1.35
2	Dwight	Shorthorn.	1,239	2,060	1.58
17	Major	Grade Shorthorn.	1,005	1,965	1.81
20	Thad. Stevens	"	1,296	2,115	1.63
30	Loring	"	1,104	2,065	1.47
31	Tom Brown	"	1,171	1,945	1.65
32	Sherman	"	1,214	2,135	1.75
33	Spot Face	Grade Hereford.	1,115	1,845	1.30
3	Ohio 1st	Shorthorn.	1,316	1,810	1.40
4	Ohio 2d	"	1,322	1,910	1.41
1	King of the West.	"	1,305	2,335	1.81
26	Canadian Champ'n.	Grade Shorthorn.	1,265	2,190	1.90
34	Duke	Grade Hereford.	1,239	1,805	1.50
35	Diamond	"	1,236	1,830	1.38
40	Norm	Grade Shorthorn.	1,270	2,060	1.63
41	Garfield	"	1,270	2,090	1.63
44	Cash	"	1,368	2,250	1.64
100	Capt. Jack	"	1,208	1,885	1.36
Average			1,278	2,030	1.59

Steer or Spayed Heifer, 2 and under 3 years.

No.	Name of Animal.	Breed.	Age in days, Nov. 1st, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
48	Jim Blaine	Grade Shorthorn.	933	1,825	1.96
49	Sandy	"	941	1,655	1.70
18	Wabash	Hereford.	1,077	1,940	1.80
19	Excelsior 4720	"	1,052	1,630	1.54
62	Conqueror H.	Grade Hereford.	806	1,705	1.97
63	Becher	"	900	1,815	1.98
64	Highland Lad	"	972	1,690	1.73
65	Wallace	"	978	1,720	1.75
110	Clarkson	Grade Shorthorn.	901	1,805	1.82
53	Grinnell	"	1,011	1,850	1.83
55	Hennett	"	1,080	1,785	1.65
57	Red Boy	Grade Hereford.	1,050	1,650	1.57
66	King William	"	970	1,655	1.71
52	Young Aberdeen	Grade Shorthorn.	902	1,740	1.93
58	Mammoth	"	858	2,220	2.59
118	Justin	"	914	1,945	2.06
50	Jesse	"	940	1,700	1.80
Average			971	1,783	1.84

Steer or Spayed Heifer, 1 and under 2 years.

No.	Name of Animal.	Breed.	Age in days, Nov. 1st, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
6	Cassius 5th	Shorthorn.	381	1,140	2.97
7	Cassius 4th	"	412	1,105	2.68
67	Benton's Champ	Grade Hereford	574	1,410	2.45
68	ton	"	501	1,250	2.23
69	Squire	"	509	1,225	2.17
21	My Marvland 1721	Hereford	697	1,330	1.90
72	Red Major	Grade Shorthorn.	715	1,600	2.23
8	(ington)	"	645	1,620	2.51
77	Clarence Kirklev	Shorthorn.	682	1,430	2.10
77	T. Eastman	Grade Shorthorn.	682	1,195	2.05
127	J. Wood	"	584	1,270	2.42
80	Conover	"	523	1,380	1.63
81	Sir Thomas	Grade Hereford.	549	1,232	2.24
82	St. Paul	"	519	1,055	2.31
70	Champion of Iowa	Grade Shorthorn.	715	1,655	2.31
Average			596	1,355	2.20

Cow, 3 years old or over.

No.	Name of Animal.	Breed.	Age in days, Nov. 1st, 1882.	Weight Nov. 15, 1882.	Average gain per day, in pounds, since birth.
9	Rosa Bell	Shorthorn.	1,580	1,800	1.13
13	Royal Charmer 6th	"	2,056	2,055	1.09
10	Manna of New d.	"	2,174	1,690	0.77
23	Pr. Alice Ma 41029	Hereford.	3,943	1,800	0.45
11	Lady Garfield	Shorthorn.	1,621	1,655	1.04
12	Acorn 6th	"	1,404	1,805	1.32
84	Ohio Belle	Grade Shorthorn.	1,636	1,915	1.11
86	Lady Peerless	"	1,644	1,880	1.14
14	Lily Dale 2d	Shorthorn.	2,306	1,760	0.73
Average			2,051	1,816	0.96



GRADE SHORT-HORN STEER, "SCRATCH."

SECTION IV.—COOKED, STEAMED AND MIXED FOOD.

It will not be necessary to consume much space in discussing the question of cooked and steamed food, except to say that for young and growing animals, and especially for breeding animals, it should never be used. In the fattening of animals, and in feeding cows where it is required to force them unduly in the secretion of milk, the employment of cooked food must be one purely of economy, precisely as the heat of the stable must. When food is dear it may pay to use cooked food. It may even pay (down to heat the stable artificially in winter, in particular cases, since a proper temperature, say sixty degrees, conserves waste that must otherwise be supplied by extra food.

MIXED RATIONS.

The feeding of mixed rations is quite a different thing. No animal will thrive nor remain healthy on a single food, however rich it may be. Oats are probably the nearest to being a perfect granivorous food, since they contain largely of the elements of nutrition and the husk acts partially as a distender of the stomach. Professor Stewart gives rations from an eastern feeder's standpoint, which we reproduce, as being valuable east of the Alleghanies. They are those which theoretically preserve fair nutritive values:

FIRST FORMULA.

Corn fodder	lbs.
Wheat bran	18
Cotton-seed meal	8
Corn meal	4

Instead of 4 lbs. cotton-seed meal, $5\frac{1}{2}$ lbs. linseed meal may be used.

SECOND FORMULA.

Corn fodder	lbs.
Oat straw	10
Linseed meal	10
Malt sprouts	2
Oat and corn meal	4
	10

THIRD FORMULA.

Wheat straw	lbs.
Corn sugar meal	18
Cotton-seed meal	40
	4

FOURTH FORMULA.

Oat straw	lbs.
Wheat bran	12
Corn-sugar meal	10
	40

From a western man's standpoint, good hay—with ear corn, or better, meal of oats and corn

ground together, in equal quantities, make a practical ration for young stock in winter. Flush pastures in summer will carry cattle properly. For fattening, corn or corn meal, with sufficient hay to properly distend the stomach, will meet every practical requirement, except in the case of young stock intended for breeding purposes.

SECTION VII.—STALL-FEEDING.

The original meaning of stall-feeding, as its name implies, was the confinement of cattle in stalls, with regular and full feeding, until they were thoroughly fattened. In cold climates shelter is necessary in winter, and hence warm stables are used, with the stock standing as closely together as possible. The cost of care and attention is here reduced to a minimum.

With freights reduced to a point far less than that by which cattle could be driven on foot for two or three hundred miles, and the added saving in loss of flesh in driving, this system of winter feeding is now the general practice in the west. The better farmers find large profit in thus caring for their entire herd. The feeding of young animals to such a degree as to keep them growing right along, from autumn until spring, is also found economical.

As we go south we find less and less shelter necessary, until at length we come to a region so mild that the protection of sheds and timber belts are, with the abundance of food, sufficient to keep stock going ahead constantly in winter. Nevertheless the great bulk of our fully fat (ripe) cattle are finished in stables with every accessory for special feeding. To reach the best results in flesh, growing animals must have exercise, else the muscle (eatable flesh) is flabby and watery.

It may be accepted that the longest period that animals may be entirely confined, without exercise, during the finishing process, is six months. If fed on sloppy food, like distillery slops, the flesh is soft, vapid, and shrinks in cooking. The flesh also partakes of the nature of the food given. Hence the reason why the grain-fed cattle of the west have firm, sweet, well-hardened, and yet juicy, tender flesh. This may be produced by a small allowance of meal, daily, with the grass of summer, keeping the animal constantly growing in winter, with the fattening process finished in close confinement, for the last three to five months of their existence.

The proper temperature of a stable is between fifty

and sixty degrees. If it go much below the freezing point, animals should be allowed exercise for some portion of the twenty-four hours. The writer, however, never had better success in fattening cattle off of grass, than by tying in warm stables in the autumn, where they remained for five months, fed on beet pulp mixed with corn meal, and with about ten pounds of hay, each, per day. As they became very fat, the hay was decreased to eight pounds, and the corn meal increased. The water was conducted through the stables in pipes; tramways carried the forage; much of the cleaning was done with a scraper, and the cattle (450 Texans) produced only nineteen of the number not prime stall-fed steers, and brought the best going price in New York, whence they were directly shipped from Illinois.

It is needless to say that the cost was less than feeding in the open fields or in closed yards. If they had been native cattle they might have been given exercise daily, and this would have been preferable. We should, however, never give exercise in the finishing process. The viscera of these cattle were quite healthy, and the flesh sweet, firm and solid. The lack of exercise, however, may not be indefinitely carried on.

SECTION VIII.—FEEDING IN THE OPEN AIR.

That it will pay better when food is specially prepared for stock to feed them in stables there is no doubt. Vast numbers of cattle are fed, however, yearly, on ear corn, corn stalks and hay, and in open but sheltered fields. The question of economy must be carefully settled, each person for himself. North of forty degrees, in the west, shelter is absolutely necessary. It is so south of this point, except in peculiarly favored localities. There open air feeding may be successfully carried on. In blue-grass regions especially, and in mild climates, cattle will get what rough feeding they require, except for two, three, or four months in the year. Here the fattening of stock is a simple operation. The steers intended for finishing off are given jerked corn (corn with the husks remaining over the ear, ear corn and hay, or else shucked corn as it comes from the stock. Two fields are required. The fattening stock pass over it first and then the growing stock. Two hogs may be allowed to one steer, among the fattening stock, and one hog to the cows and steers, among the stockers, the swine receiving what corn they require

every evening in addition to what they glean from the feeding yards.

SECTION IX.—FEEDING FOR MILK.

The question of feeding for milk requires attention. Here the food not required for sustaining daily waste, instead of producing flesh, produces milk. There is one peculiarity about the production of milk: The animal must be kept up to a regular flow; if a cow fall away seriously in her milk, it is difficult to bring her again back to the full flow. If the shrinkage is repeated, she gradually diminishes in her milk, until it ceases altogether. When again in calf the flow naturally diminishes as the fetus makes stronger and stronger demands upon the animal economy.

A cow highly fed and persistently milked for several years, with but slight intermissions between one calving time and another, becomes worn out and worthless both as a breeder and as a milker. To get the best returns both in good milk and calves of great vitality, the cow should have not less than three months' rest, each year. During this time she should be liberally fed but not especially forced.

CARE AFTER CALVING.

Care must be taken that milk fever does not set in after calving. It is more due to artificial feeding and lack of exercise than anything else. If the cow has been well fed, and has plenty of exercise, it will not matter that she lose a little flesh after calving. After the calf is two weeks old, the feeding may gradually be increased, until the maximum feeding is reached at the time the calf is six weeks old. The cow may even have lost flesh all this time. She will thereafter hold her own, and perhaps gain in flesh right along. But if the gain is in flesh, instead of milk, the cow should be discarded as unfit either for the dairy or for breeding dairy cattle.

CHAPTER VIII.

SHELTERING STOCK.

SECTION I.—ECONOMY OF SHELTER.

The animal heat must be kept up to about ninety-six degrees whatever the outside temperature. This animal heat is constantly passing off. If it were not for perspiration and consequent evaporation in summer, thus cooling the system, death would quickly ensue. In cattle and dogs, the excess of heat is passed off principally in the breath, and

hence, to give relief, when much heated, the mouth is opened and the tongue protruded. In the winter if the heat is passed away from the body faster than it can be furnished, lethargy and death ensue.

In providing shelter for animals the question of economy must always be taken into consideration. The simplest shelter, if it be proof against winds entering, may be as good as the more elaborate stable. It may be easily constructed, and as a makeshift, until some more permanent structure can be built, it may be economical; but, some permanent barn and stable combined, or special stables for different classes of stock are always cheapest.

SECTION II.—THE VALUE OF WINDBREAKS.

The value of windbreaks and shelter belts is not sufficiently estimated. In a still atmosphere animals and man remain comparatively comfortable, even in extreme temperatures. The solution is simple. Instead of the heat of the body being blown away, an atmosphere of heat is carried immediately about with the body. The shelter of windbreaks is valuable in assisting to keep the temperature of stables intact. Unless the structure is of the most finished character, wind finds its way through every crack and crevice however well buttressed. If there should be planted proper windbreaks of evergreens, outside the yards surrounding the farm buildings, especially on the side from which our severe winter winds come, the principal objection to cheap structures would be avoided. The stock when turned out for exercise would also have the advantage of a calm temperature.

We regard shelter belts, therefore, near barns, as ordinarily built, and especially near sheds, as of the first importance.

TREES FOR SHELTER BELTS.

They may be composed of any of the evergreens, but Norway spruce and white pine are the best, and in the order named. They grow fast; they are reasonably close; they bear cutting well, and they are at home in a great variety of prairie soils. If deciduous trees are used, there is nothing better than the beech.

A perfect windbreak should not be less than four rods wide, the trees to be so planted that the place where one is set may break into that of the other. This affords ample scope for the wind to sift through, partially, but at the same time gives a large, calm space on the leeward side of the planting.

FENCE AND WALL PROTECTION.

An impervious board fence or wall protects for a certain space, according to its height. Just beyond this line the effect of the wind is more severe than in the open field. This point is just where the wind again strikes the earth, after having leaped the barrier. The effect is measurably the same with a single line of evergreens planted so closely as to form an impervious barrier. The true economy in protecting against wind is not to obstruct the flow entirely, but to so obstruct as to break its violence near the earth and thus create a measurably still atmosphere.

SECTION III.—ROUGH SHEDS.

The making of rough sheds is the first attempt at shelter. So far as warmth is concerned, a double line of stakes set one foot apart, in a trench, and the space between filled with some kind of dead litter, that stock will not eat, or so lined outside that stock cannot get at it, the framework of posts or poles, with a good topping of hay or straw descending well down over the eaves on each side, makes the perfection of shed shelter so far as warmth is concerned. It is also the cheapest shed shelter that can be made where poles and slough hay may be had for the cutting.

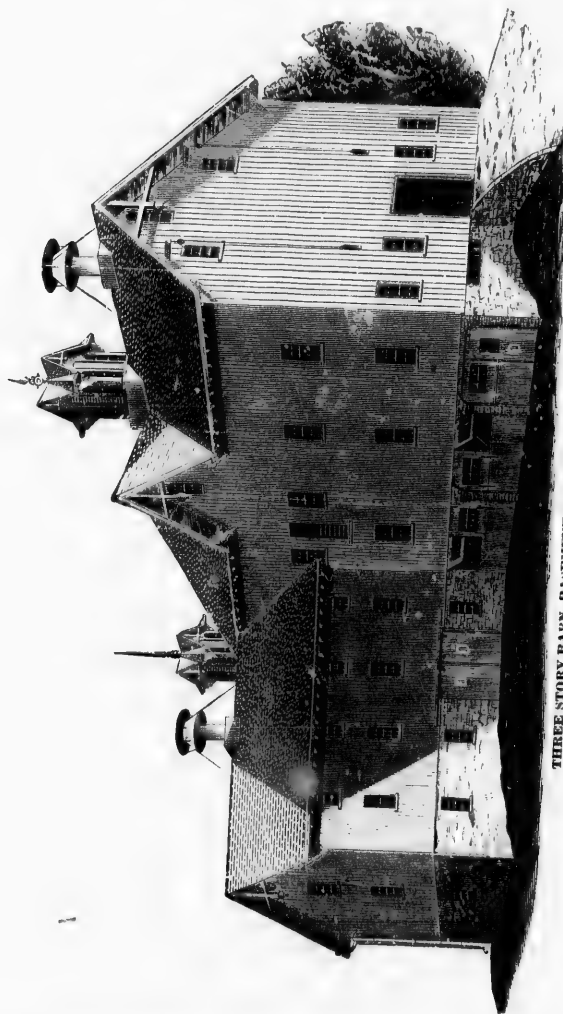
The stakes containing the filling should slant considerably from the ground to the eaves, under the hay roof, so it may come well under the same. Then, if the hay roof is properly made, the material will keep perfectly for years with slight mending, and may even serve to eke out the fodder in the spring in case of an unusually hard winter, other forage being consumed.

It is not necessary to follow the subject, except to say that every farm should have abundance of shed room, and the sheds should conform in appearance with the other farm buildings.

Every pasture should also have some rough temporary shelter, that may be boarded up so as to be made partially dark in fly time. This should be sufficient to amply accommodate all the stock when at pasture, and should be located on the highest point of land, with sufficient egress so that stock may not injure one another. It will pay better than trees planted for shade; as a protection against storms, and against flies in summer, is of the first importance.

SECTION IV.—CATTLE BARN.

The question of barns is one of the first importance



THREE STORY BARN, BASEMENT VENTILATION AND APPROACH.

to the stockman. If to be used for hay and grain the building should be high—not less than two full stories, besides the basement. However simple the structure, the question of height is important. The same roof space covers a high structure as is required for a low one. The present improved machinery for unloading and carrying hay enables all this space to be taken advantage of.

In building a simple square or oblong barn, an intelligent master carpenter can make the plan, once he gets the ideas of the prospective owner as to size and intended use. The internal arrangements are of most importance. Hence, in our illustrations of barns, we only give those most complete in every respect, and combined in their use for a variety of purposes.

On page 75 we give one view of a complete three-story barn, with full description. We here illustrate two other views of the same barn. The description, in connection with the view on page 71, will enable any architect to fully carry out the idea, or to so modify the whole as to meet the particular wants of individuals.

In the construction of a perfect and costly barn, it will pay to employ the services of a competent architect, but he must be one familiar with the construction of farm buildings. Then, after receiving the ideas of the stock master as to space, and its uses, cash outlay, etc., proposed, he can work understandingly, and save the farmer far more than his fees.

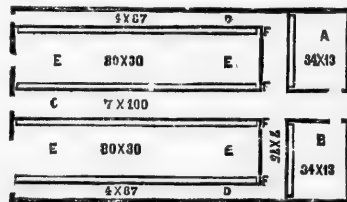
BASEMENT BARN.

In relation to barns with basements built partly into and partly outside the slope, or when the basement abuts against a slope, if the bank against which the barn is built has sufficient elevation so the team may be driven directly upon the second floor, it will be proper to build with reference to this. If not, do not waste money in an expensive causeway. An apparatus for elevating forage, etc., will be much more economical. A very slight bank will enable the team to be easily driven upon the first floor above the basement. In the views we give are shown the two principal yards, and also the enclosed and unenclosed basement of the barn. The northwest view, as given on page 75 shows the embankment to the floor above the basement, with facilities for lifting, storing, etc. In the engravings, the doors are all shown suspended on rollers upon which they slide. The

windows are all hinged at the tops, so as to swing inward. This barn stands upon a hillside sloping east. It has three distinct floors, and the barn consists of a main building fifty-five by eighty feet, an east wing fifty-six feet long and thirty-one and a half feet wide; the south wing being fifty-six by thirty-five feet; the total length from north to south being one hundred and thirty-six feet.

THE BASEMENT.

A basement plan, a diagram of which is shown, fully explains itself. It is thus given so any one intending to build a barn different in shape and construction may easily adapt the means at hand to his particular wants. It is figured for a building seventy-



Ground Plan of Stock Barn.

five by one hundred feet in size. A, is the horse stable; B, cow stable; C, C, main passage way; D, D, side passages; E, E, E, E, standings for cattle; F, F, F, F, troughs at heads of cattle, to the stanchions of which the cattle are tied; and the stock may be watered from the points, F, F, F, F, by means of faucets from the water pipes running through the stables.

SECTION V.—INTERNAL ARRANGEMENTS.

These must depend entirely upon the particular requirements of the owner, and must be adapted to the special wants of the stock kept. Above all, the ventilation must be perfect. Cattle may stand in stanchions, but they are better tied by means of chain ties about their necks. These are now kept by all hardware stores. The floors upon which the cattle stand must be of such material that no moisture can soak in, and the depression behind them for manure must be so graduated that the excrement will not lodge on the platform on which the cattle rest. Hence the necessity of having different lengths for stock, one or two years past, and also for full-grown steers. Cows should always, of course, be kept by



BARN SHOWING GATES TO OPEN INTO YARD.

themselves. A reference to the diagram of the basement of the barn will explain our meaning.

SECTION VI.—CATTLE FASTENINGS.

There is no doubt but that four-inch iron rings to slide upon three-inch smooth stakes are the best connection for cattle ties. These stakes (smooth three-inch saplings) may be three feet apart for cows and three feet three inches, or—for very large oxen—three feet six inches apart. These are sharpened to two inches at each end. Posts seven feet apart, projecting three feet above ground, may be cut in one foot from the ground to receive six-inch scantling, bored at proper distances, to receive the ends of the standards upon which the rings slip. Pin the scantling firmly to the posts, drive the standards tight, and pin with half-inch hickory pins. Slip on the rings, lay another six-inch scantling bored similarly to the first, on top of the posts entering the standards which should be shaved at the top so they will enter easily as you proceed. Pin the upper scantling also firmly to the posts, and the whole is then ready for the ties.

These ties may be made by cutting stout rope seven feet long, for large cattle, or six feet six inches for smaller cattle. Bend a four-inch loop on one end, whip the other end by binding with cord so it will not unravel. Pass the rope through the ring until within eight inches of the loop, and whip the two parts of the rope together as far as the loop. The cattle are then tied by passing the rope about the neck, through the loop, drawing to the right tension, so it cannot be slipped over the horns, and making all fast, either by half hitches, or better, by making a bow knot and passing the end of the rope through the bow. Thus, cattle may reach forward into the passage for food, back up sufficiently to lie down comfortably, and also lick nearly every part of the body, and will rest much more comfortably than in stanchions.

STANCHIONS.

It cannot be denied, however, that by means of stanchions, cattle may be more easily fastened and unfastened, especially if they are so arranged that the whole may be released or fastened at once from the end. If the cattle reach too far forward into the passage, nail a narrow board at such a height as to obstruct them.

There are many patent stanchions. Aside from the objection that they confine cattle rigidly, and with but little power of motion, they are the most econom-

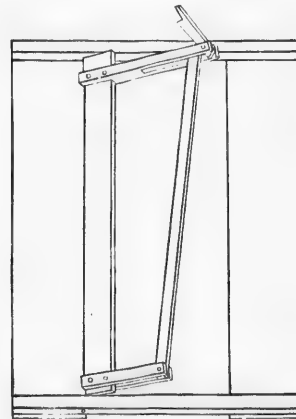
ical of any plan. Cattle cannot interfere with their mates on either side, and they leave their droppings in the gutter, thus saving time in cleaning and preventing the fouling of the standings and the cattle themselves. Many patents have from time to time been granted for improvements in stanchions, many of which were mere complications and without merit over the old fashioned cramp stanchion.

A correspondent has lately shown in the *Breeders Gazette* some stanchions that combine the essential features of simplicity and adaptability, the patents upon which have expired. We have reproduced the cuts and edited the matter to present the whole as object lessons that may be easily understood. They may be used, it says, without fear of infringing any private rights, since all are public property, except the last shown, and that will be during the year 1885.

The views will enable any carpenter to put them up.

THE SAFFORD PATENT.

This expired in 1883. Our authority says: "It



The Safford Stanchion.

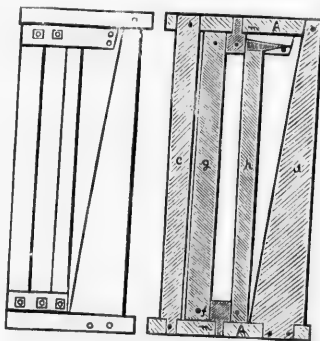
is composed of an upper and a lower horizontal stringer, into which is pivoted a vertical bar, which forms one side of the stanchion. To the bottom of this swiveled bar two horizontal pieces are securely fastened, in the outer ends of which is pivoted the swinging side of the stanchion. The upper end of

this swinging bar vibrates within a slotted, horizontal projecting bar, which is rigidly secured to the swiveling side of the stanchion, as shown. The adjustable bar of the stanchion has sufficient play within the upper horizontal bar, when operated, to fasten and unfasten the cattle. When this fastening bar is shoved toward the neck of an animal, after its head is within the stanchion, the pivoted catch, shown in the illustration, falls, and the notch therein enters behind the bar and holds it firmly in place. The catch is thrown up by hand or otherwise when it is desired to release the cattle.

"It will be noticed that the pivoted or swiveling motion of the vertical left-hand fastening rail of the stanchion carries with it both of the fastening rails, so that cattle can easily turn their heads around to the right or left; and when lying down it allows them to turn the head at pleasure, and, it is said, gives them more freedom and comfort."

THE MANLEY STANCHION.

This also has a pivotal movement; but the pivotal point is midway between the fastening rails. Thus the stanchion will turn as freely in one direction as



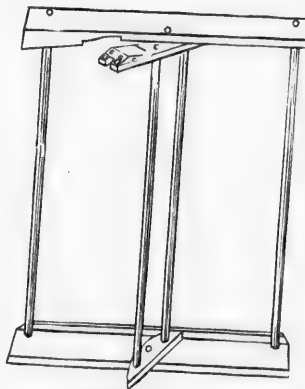
The Manley Stanchion.

in the other. The pivots are formed in cross-heads at either end of the stanchion bars, the upper end of which is elongated at one side to provide for the oscillating movement of one of the fastening bars. The end of the groove in the upper cross-head is shown in the cut, as is also the trigger-block, hinged to the cross-head, and is so arranged that, when the left hand vibrating bar is shoved inwardly to fasten

the occupant of the stanchion, the inner end of the block falls below the bar that holds it in place. In the top stringer, in which the stanchion is mounted, is a longitudinal groove—not shown—which forms a continuation of a groove in the cross-head in which the adjusting bar of the stanchion slides. When it is desired to release cattle from this stanchion the cross-heads are swung into line with the supporting stringers; and so, also, that the groove in the cross-head (in which the adjusting bar slides) shall be in line with the groove in the upper stringer. By throwing up a hinged block on the stringer the adjusting bar is released, the top of which may be then thrown outwardly through the groove in the cross-head into the groove in the upper stationary stringer, thereby keeping the whole stanchion in position ready to receive the animal when it comes in again to be fastened.

THE MANN STANCHION.

This device also employs the rotary principle, enabling cattle large liberty of motion. It turns later-



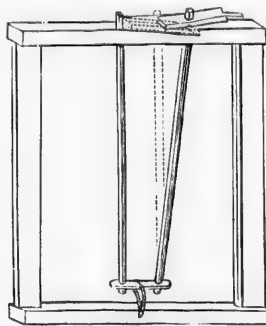
The Mann Stanchion.

ally on journals, and is adjustable to different sized animals, whether standing or lying down. It is composed of two horizontal bars, a rigid connecting bar, and a movable bar. The vertically-moving bar is hinged to the lower horizontal bar, and extends into a slot formed in the upper horizontal bar. A pawl arranged in this slot serves to hold the movable fastening bar in parallelism with the adjoining

stationary bar. By raising the pawl the fastening bar may be moved so as to admit the head of an animal into the stanchion, or to remove it therefrom. The journals of the horizontal connecting bars enter bearings in the upper and lower stringers, and admit of the stanchion being revolved or turned laterally.

THE LATER SAFFORD STANCHION.

In 1868 Mr. Safford devised an improved stanchion, which consists in hanging the upright parts of



The Later Safford Stanchion.

the stanchion loosely in the top stringer, and securing the bottom of the stanchion to the lower stringer by a rope or chain, so as to give a limited pendulum-like movement to the stanchion. This arrangement and construction results in freedom of motion, so that the stock may turn their heads from the feeding place when lying down, and does not confine their heads in an unnatural position. The vertical stanchion rails being hung loosely, and revolving in the lower horizontal yoke, may twist to the right or left to a degree that would bring the lower yoke nearly or quite in a line with the length of the stall. A rope or chain is connected to the lower horizontal yoke at one end and to the floor at the other, to prevent too great a swinging movement of the lower ends of the stanchion rails. The whole is clearly shown in the cut. This patent expires in 1885, after which time it may be freely used.

SECTION VII.—THE WATER SUPPLY.

Every person who keeps stock, however few in number, must be assured of a permanent and ample

water supply. No animals can thrive that have to be driven a considerable distance once or twice a day, to drink out of holes cut in the ice. Cattle will drink out of stagnant pools in summer. It is not, however, good for them; and in no case should it be allowed for milch cows. The best water for stock is pure well water, unless a running stream passes through the farm. From either of these the water may be elevated by a wind-mill at the barn, so that a constant supply may be had.

IMPORTANCE OF WATER.

For cattle that are confined it is better that water be led to every one by means of pipes. They should be offered water three times a day, and milch cows especially should be induced to drink plentifully. No cow can possibly be a good milker unless she be a large feeder, and however good a feeder she may be, unless supplied with large quantities of water, she cannot secrete milk largely. The same applies measurably to fattening cattle. They must have water enough to take up and hold every particle of nutriment in the food; for remember what we have already stated, food is only converted into flesh and milk by first being rendered soluble in water. Milk is nearly all water, and the flesh of animals is over seventy per cent water.

CHAPTER IX.

ANATOMY AND PHYSIOLOGY OF CATTLE.

SECTION I.—BONES AND THEIR ECONOMY.

The bones of an animal constitute the framework which supports the whole animal economy. The finer these are, without being fragile, the better the animal. By fineness we mean density of structure as opposed to porosity. We say a horse should have a flat leg, but the bones of the leg are really round, or nearly so. The flat appearance is given by the small bones of the leg and the back sinews. In the ox we only see this appearance comparatively, even in the hind legs.

The fore-legs have not the flat appearance as seen in the horse. The reason is, the ox is a heavy, sluggish animal, not requiring high speed. Hence the bones simply have to support the weight of the ox, and great sinew and firm muscular development are not needed as in the horse.

SECTION II.—MUSCULAR DEVELOPMENT.

The muscular development of the better kinds of beef cattle lies in the large distribution of succulent

flesh in those parts where the thickest muscles naturally lie. These are the thighs, rump, loin, middle and fore ribs and the shoulder. These are the superior parts in beef cattle. In milking breeds the shoulder is lighter and the buttocks heavier than in beef cattle.

In beef breeds, the carcass, viewed longitudinally, should present the appearance of an oblong square, or rather, that of a rounded parallelogram. This roundness is especially noticed in the fat Devon, while in the Shorthorn the appearance of squareness is better preserved. In milking cattle, the body, viewed from before, shows a somewhat wedge-shaped appearance, with rather large belly, great thighs and roomy udder. Practically, these are the main differences, and with a digest given further on from the works of Dickson, a practical English cattle dealer of the early part of the century, will instruct in what constitutes well-formed cattle, and which more modern observation has not changed.

SECTION III.—THE BREATHING ORGANS.

The lungs of cattle are rather large for the bulk of the body. They are required to aerate much blood, for it is only through the office of the blood that the muscle, sinew, fat, bone and other parts of the animal economy are built up, or kept intact. In fact, all the viscera of cattle are large, since, their natural food being grass, a large quantity must be consumed in order to lay on a large amount of flesh and fat in summer, to serve during seasons of scarcity. It is also from the lungs that in cattle much of the water of the system is expelled, hence when heated, cattle open their mouths in order to give relief to the increased action of the lungs, in the effort to obviate a clogging of the system.

SECTION IV.—DIGESTIVE ORGANS.

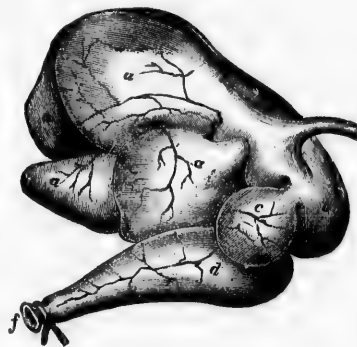
The digestive organs of the ox, and in fact, all ruminating animals, are complex. The ox and sheep are ruminating animals; that is, their hoofs are parted and they chew the cud. All the genus bos, including the buffalo of the Eastern hemisphere and the bison of the Western hemisphere are ruminants. The deer, antelope, elk, moose, camel and some other wild herbivorous animals are also ruminants.

All such animals in feeding, simply gather the food and swallow it, without further chewing than to moisten it and gather it into masses. All these animals have four stomachs. The food passes into the first stomach; here it is further moistened; is thence passed into the second stomach, where it receives

still further moisture, and is worked and rolled into balls. It is then raised and rechewed. This is called chewing the cud, or rumination. Again being swallowed, it now passes into the third stomach, where it is prepared for final digestion in the fourth or last stomach; and from thence it is passed into the bowels, whence all those soluble portions necessary for nutrition are separated and passed to every part of the system, where it is incorporated with, and in fact becomes blood. The blood, therefore, in all animals, is the direct means of nutrition. In all animals which chew the cud, cessation of rumination—called loss of the cud—indicates loss of health, just as loss of appetite does in other animals.

DIGESTIVE ORGANS OF THE OX.

In order to present this clearly we illustrate the digestive organs, accurately figured. In the sucking calf the organs here shown largest, are smallest, for the reason that the calf does not ruminate until it begins to eat solid food, and the milk passes directly into the true digestive stomach. As the calf increases in age the abomasum, or fourth stomach, grows relatively less and less while the others increase in size relatively until at length their relative size is as figured below:



Digestive Organs of the Ox.

- a, the Rumen, or paunch.
- b, Reticulum, or second stomach; sometimes called honeycomb.
- c, Omasum, or third stomach; sometimes called manyplies.
- d, Abomasum, rennet, or true digestive stomach.

e, Esophagus, or gullet.

f, Pylorus, or entrance to the intestines.

SECTION V.—ANATOMY AND PHYSIOLOGY BY POINTS.

This we give from the experience of the best English authorities (sifted down) for the reason that they have been careful observers, dealing in matters applicable to all breeds used for beef. First we quote from Youatt, who was not only a scientific man, but keen, careful and accurate. All cattle intended for beef, says our authority, should be wide and of deep girth about the heart and lungs; and not only about these, but about the whole of the ribs must we have both depth and roundness; the hooped as well as the deep barrel is essential. The breast should also be ribbed home; there should be little space between the ribs and the hips. This is indispensable in the fattening ox, but a largeness and drooping of the belly is excusable in the cow. It leaves room for the udder, and if it is also accompanied by swelling milk-veins, it generally indicates her value in the dairy. This roundness and depth of the barrel, however, is most advantageous in proportion as it is found behind the point of the elbow, more than between the shoulders and legs; or low down between the legs, than upward toward the withers; for it diminishes the heaviness before, and the comparative bulk of the coarser parts of the animal, which is always a very great consideration.

The loins should be wide, for these are the prime parts; they should seem to extend far along the back; and although the belly should not hang down, the flanks should be round and deep, the hips large, without being ragged, round rather than wide, and present, when handled, plenty of muscle and fat; the thighs full and long, and when viewed from behind, close together; the legs short, for there is almost an inseparable connection between length of leg and lightness of carcass, and shortness of leg and propensity to fatten. The bones of the legs and of the frame generally should be small, but not too small; small enough for the well-known accompaniment, a propensity to fatten; small enough to please the consumer, but not so small as to indicate delicacy of constitution and liability to disease. Finally, the hide, the most important thing of all, should be thin, but not so thin as to indicate that the animal can endure no hardships, movable, mellow, but not too loose, and particularly well covered with fine and soft hair.

MR. JAMES DICKSON ON POINTS.

Were an ox of fine symmetry and high condition placed before a person not a judge of live stock, his opinion of its excellences would be derived from a very limited view, and consequently from only a few of its qualities. He might observe and admire the beautiful outline of its figure, for that would strike the most casual observer. He might be pleased with the tint of its colors, the plumpness of its body, and the smoothness and glossiness of its skin. He might be even delighted with the gentle and complacent expression of its countenance; all these properties he might judge of by the eye alone. On touching the animal with the hand, he could feel the softness of its body, occasioned by the fatness of the flesh. But no man not a judge could rightly criticise the properties of an ox farther. He could not possibly discover without tuition those properties which had chiefly conduced to produce the high condition in which he saw the ox. He would hardly believe that a judge can ascertain merely by the eye, from its general aspect, whether the ox were in good or bad health; from the color of its skin, whether it were of a pure or cross breed; from the expression of its countenance, whether it were a quiet leader; and from the nature of its flesh, whether it had arrived at maturity. The discoveries made by the hand of a judge might even stagger his belief. He could scarcely conceive that the hand can feel a hidden property. The touch, which of all tests is the most surely indicative of fine quality of flesh and of disposition to fatten, can find whether that flesh is of the most valuable kind; and it can foretell the probable abundance of fat in the interior of the carcass. In short, a judge alone can discriminate between the relative values of the different points, or appreciate the aggregate value of all the points of an ox.

JUDGING BY POINTS.

"Points" are the parts of an ox by which it is judged. The first point to be ascertained in examining an ox, is the purity of its breed, whatever that may be; for that will give the degree of the disposition to fatten of the individuals of that breed. The purity of the breed may be ascertained from several marks, the color or colors of the skin of a pure breed of cattle, whatever those colors are, are always definite. The color of the bald skin on the nose and round the eyes, in a pure breed, is always definite, and without spots. This last is an essential point.

When horns exist, they should be smooth, small, tapering, and sharp-pointed, long or short, according to the breed, and of a white color throughout in some breeds, and tipped with black in others. The shape of the horn is a less essential point than the color. Applying these remarks on the different breeds in Scotland, as illustrations of the point which we have been considering, we have the definite colors of white and red in the Shorthorns. The color is either entirely white or entirely red, or the one or the other predominates in their mixture. The skin on the nose and around the eyes is uniformly of a rich cream color. The Ayrshire breed, in its purity, is also distinguished by the red and white color of the skin, but always mixed, and the mixture consists of spots of greater or smaller size not blended together. The color of the skin on the nose and around the eye is not definite, but generally black or cream colored. In other points, these two celebrated breeds differ from one another more than in the characters which I have just described. In the West Highland, Angus, and Galloway breeds, the color of the skin of the nose and around the eyes is indicative of the pure blood of black colored cattle, but a cream colored nose may frequently be observed amongst the other colors of skin. The characters above given will certainly apply to the purity of the blood in the Shorthorn and Ayrshire breeds, if not to the West Highlanders.

THE CARCASS.

The second point to be ascertained in an ox is the form of its carcass. It is found that the nearer the section of the carcass of a fat ox, taken longitudinally vertical, transversely vertical, and horizontally, approaches to the figure of a parallelogram, the greater quantity of flesh will it carry within the same measurement. That the carcass may fill up the parallelogram as well as its rounded form is capable of filling up a right-angled figure, it should possess the following configuration: The back should be straight from the top of the shoulder to the tail. The tail should fall perpendicularly from the line of the back. The buttocks and twist should be well filled out. The brisket should project to a line dropped from the middle of the neck. The belly should be straight longitudinally, and round laterally, and filled at the flanks. The ribs should be round, and should project horizontally, and at right angles to the back. The hooks should be wide and

flat; and the rump from the tail to the hooks, should also be filled and well filled. The quarter from the edge-bone to the hook should be long. The loin bones should be long, broad and flat, and well filled; but the space betwixt the hooks and the short ribs should be rather short and well arched over, with a thickness of beef between the hooks. A long hollow from the hooks to the short ribs indicates a weak constitution and an indifferent thriver. From the loin to the shoulder-blade should be nearly of one breadth, and from thence it should taper a little to the front of the shoulder. The neck-vein should be well filled forward to complete the line from the neck to the brisket. The covering on the shoulder-blade should be as full out as the buttocks. The middle ribs should be well filled, to complete the line from the shoulders to the buttocks along the projection of the outside of the ribs; these constitute all the points which are essential to a fat ox.

JUDGING A LEAN OX.

A round, thick bone indicates both a slow feeder and an inferior description of flesh. A flat bone, when seen on a side view, and narrow when viewed either from behind or before the animal, indicates the opposite properties of a round bone. The whole bones in the carcass should bear a small proportion in bulk and weight to the flesh, the bones being only required as a support to the flesh. The texture of the bone should be small-grained and hard. The bones of the head should be fine and clean, and only covered with skin and muscle, and not with lumps of fat and flesh, which always give a heavy-headed, dull appearance to an ox. The fore-arm and hock should also be clean and full of muscle, to endure traveling. Large joints indicate bad feeders. The neck of an ox should be contrary to that of the sheep, small from the back of the head to the middle of the neck. A full, clear, and prominent eye is another point to be considered, because it is a nice indication of good breeding. It is always attendant on fine bone; the expression of the eye is an excellent index of many properties in the ox. A dull, heavy eye clearly indicates a slow feeder. A rolling eye, showing much white, is expressive of a restless, capricious disposition, which is incompatible with quiet feeding. A calm, complacent expression of eye and face is strongly indicative of a sweet and patient disposition, and of course kindly feeding. The eye is frequently a faithful index of the state of health. A cheerful,

clear eye accompanies good health; a constantly dull one proves the probable existence of some internal lingering disease; the dullness of eye, however, arising from internal disease is quite different in character from a natural or constitutional phlegmatic dullness.

THE SKIN.

The state of the skin is the next point to be ascertained; the skin affords what is technically and emphatically called the touch—a criterion second to none in judging of the feeding properties of an ox. The touch may be good or bad, fine or harsh, or, as it is often termed, hard or mellow. A thick, firm skin, which is generally covered with thick set, hard, short hair, always touches hard, and indicates a bad feeder. A thin, meager, papery skin, covered with thin, silky hair, being the opposite of the one just described, does not, however, afford good touch. Such skin is indicative of weakness of constitution, though of good feeding properties. A perfect touch will be found with a thick, loose skin, floating, as it were, on a layer of soft fat, yielding to the least pressure, and springing back to the finger like a piece of soft, thick chamois leather, and covered with thick, glossy, soft hair. It is not unlike a bed of fine, soft moss, and hence such a skin is not unfrequently styled "mossy." A knowledge of touch can only be acquired by long practice; but after having acquired it, it is of itself a sufficient means of judging of the feeding quality of an ox, because, when present, the properties of symmetrical form, fine bone, sweet disposition, and purity of blood are the general accompaniments.

THE GENERAL APPEARANCE.

There are other and important considerations in forming a thorough judgment of the ox. The head should be small, and set on the neck as if easily carried by the animal; this shows the animal to advantage in the market. The face long from the eyes to the point of the nose. The skull broad across the eyes, contracted a little above them, but tapering considerably below them to the nose. The muzzle fine and small; the nostrils capacious; the ears large, a little erect, and transparent; the neck short and light. A droop of the neck from the top of the shoulder to the head indicates a weakness of constitution, arising frequently from breeding too near akin. The legs below the knees should be rather short than long, and clean made; stand where they apparently bear the weight of the body most easily,

and wide asunder. The tail rather thick than otherwise, as that indicates a strong spine, and a good weigher. It should be provided with a large tuft of long hair.

DISTRIBUTION OF THE FLESH.

The position of the flesh is important. The fore and middle ribs, the loins and the rump, or hook-bone, are of the finest quality, and are generally used for roasts and steaks; consequently the ox which carries the largest quantity of beef on these points is the most valuable. Flesh of fine quality is actually of a finer texture than coarse flesh. The other desirable objects in a fat ox are a full twist, lining the division between the hams called "the closing" with a thick layer of fat, a thick flank, and a full neck bend; these generally indicate internal fallow. The last points generally covered with fat are the point of the shoulder-joint and the top of the shoulder; if these parts are, therefore, felt to be well covered, the other and better parts of the animal may be considered ripe. It is proper, in judging of the weight of a fat ox, to view his gait while walking toward you, which will, if the ox has been well fed, be accompanied with a heavy, rolling tread on the ground.

SECTION VII.—TEETH AND THE AGE OF CATTLE.

The age of cattle may be accurately determined by the teeth up to the age of eight years, but the wear will be more on gritty pastures than on clayey ones. We state the appearance of the teeth as seen until the age of fifteen years, yet cattle are not kept longer than from four to six years old, except in the case of cows, and these not longer than eight years, unless valuable as breeders or as extra milkers.

JUDGING BY THE TEETH.

A calf, when first born, has usually two front teeth, or they will appear in a day or two after birth. In a fortnight he will have four, in three weeks six, and at the end of a month eight. After this, these milk-teeth, as they are called, gradually wear and fall out, and are replaced by the second and permanent teeth.

At two years old the two middle teeth are replaced; the next year there will be four new teeth in all; at four years there are six permanent teeth, and at five the whole eight are replaced. The milk teeth do not always fall out, but are sometimes pushed back by the second set; and in this case they should be removed with an instrument, as they impede mastication and irritate the mouth.

After six years old the edges of the teeth begin to wear flat, and as they wear off the root of the tooth is pushed up in the socket, and the width of the teeth is diminished, leaving interstices between them; this begins in the middle teeth and extends gradually to the corners.

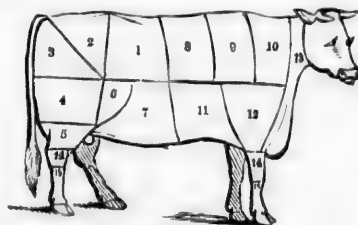
At ten years old the four middle teeth are considerably diminished and the mark worn out of them. After fifteen years of age few cows can keep themselves in condition by pasturing.

JUDGING BY THE HORNS.

Cattle have rings at the root of their horns, by which the age may also be known. The first ring appears at three years of age, and a new one is formed between it and the skull every year after. But this mode of ascertaining the age is not so sure as by the teeth, deception being much easier by filing off the rings.

SECTION VIII.—FLESH POINTS OF THE OX ILLUSTRATED.

The carcass of a steer may be represented as in the diagram, as may be seen on referring to the numbers.



Flesh Points of the Ox.

HIND-QUARTER.

1. Loin.
2. Rump.
3. Edge or adze-bone.
4. Buttock.
5. Hock.
6. Thick flank.
7. Thin flank.
8. Fore-rib.

FORE-QUARTER.

9. Middle rib.
10. Chuck rib.
11. Brisket.
12. Leg-of-mutton piece.
13. Clod and st'k'g and n'k.
14. Shin.
15. Leg.

The relative value of these different pieces may be stated thus: Their current value, namely, when the rumps, loins and fore-ribs of a fine ox fetch 16 cents a pound, the thick flank, buttock and middle rib will fetch 12; the itch or adze-bone, thin flank, chuck rib, brisket and leg-of-mutton piece, 10; the clod and

sticking and neck, 6; and the legs and shins, 4 cents a pound.

ESTIMATING FLESH POINTS.

The ox or cow that will produce the most flesh in those parts numbered 1, 2, 8, 3, 4, 9, 6, 7 and 11—is the most profitable. To do this the ox must have a thick, soft coat of hair, a rather thick but mellow hide, a head rather long than broad, the bones fine. The tail may be rather thick at the setting on, but it should taper down small and carry a good brush at the end. The horns, dense and tapering to the points denotes a fine, strong bone. The ribs should be well sprung, for this gives ample room for the heart, lungs, liver and digestive organs, and hence insures good feeding capacity and strong digestion. This also insures thick meat over 1, 8, 9, 6, 7 and 11, and plenty of meat carried in these points ensures thick flesh in 2, 3 and 4, and should give from 55 to 65 pounds of meat to 100 pounds live weight. Cows and heifers give less of valuable meat and more fat than steers, and this accounts for the higher price paid by butchers for steers than cows. They cut more profitably. The grade steer, "Scratch," page 286, may serve as a good model.

CHAPTER X.

CONTAGIOUS AND EPIDEMIC DISEASES OF CATTLE.

SECTION I.—CONTAGIOUS PLEURO-PNEUMONIA.

This terrible disease of cattle, and one for which no cure is yet known, and which from the insidious, lasting and virulent nature of the infection, once generally established over a country has not yet been known to be eradicated, has been twice introduced into some seaboard States of the Union.

KILL AND BURY.

Once it has attacked a herd there is only one course to pursue; to promptly kill and bury with quick lime, deep down in the earth, the dead animals, including every part, being careful to slash the hide, that no one may dig it up for its value.

ISOLATION AND DISINFECTION.

The animals not known to be infected must be fully and thoroughly isolated from the rest of the herd and from all other cattle, for at least three months from the time of the removal of the last animal infected. Everything about the barn, stable,

or place where the stock have been kept must be thoroughly disinfected, and all substances not of considerable value, including clothing, is better burned. No person supposed to have been with the infected herd must approach the supposedly well ones without the most complete disinfection, repeated after each visit to the sick animals. So fearful has the contagion been in Great Britain, and so fatal to property, that the government, through proper officers, immediately kill infected animals where found, and quarantine all others of the herd.

GOVERNMENT INTERVENTION.

The same plan is less completely used in those States east of the Alleghenies in the treatment of this pestilence. Fortunately the disease has not yet appeared west of the Alleghenies. It will be only a question of time when it will do so, unless the general government shall adopt the most stringent measures to prevent it. Once introduced to the herds of the West, the whole United States will become infected, and hundreds of millions of dollars will not cover the loss inflicted upon the cattle interest of the country.

SECTION II.—HOW TO KNOW PLEURO-PNEUMONIA.

Often a correct diagnosis is difficult, even by the best veterinary surgeons, until the fatal symptoms are pronounced. That every reader of this work may get at important facts connected with the disease, in case it may ever come to be suspected in his or a contiguous neighborhood, we embody important facts and symptoms in connection with the disease.

APPEARANCE OF INFECTED ANIMALS.

From the report of the commission appointed to diagnose the disease in New York State, we condense the following symptoms:

At first the animal appears dejected, and, when in the field, separates itself from its fellows, often getting behind a wall, hedge or other shelter to keep out of the wind. As the disease progresses, it becomes uneasy, loses its appetite, and ceases to chew the cud; the eyes appear dull, the head is lowered, the nose stuck forward, the nostrils expanded, and the horns and skin are warmer than common. With failure of the appetite, thirst may continue and increase. In cows, the milk falls off either gradually or altogether. It is seldom that the first progress of the disease attracts much notice until the animal stops eating. Cough, although often accompanying

the disease, is by no means a constant symptom. When, however, the pleura or lining membrane of the windpipe or the bronchial tubes become inflamed, loud and harsh coughing is a never-failing symptom. Pressure between the ribs and along the spine causes the animal to wince. The breath grows warmer and often fetid, the danger rapidly increasing. The animal will often press the muzzle hard against the partition, as if for support, will breathe with great difficulty, and soon dies. The progressive symptoms vary greatly in different animals, but the cough is the keynote of the disease, and appears in all.

DIAGNOSIS OF PROF. LAW.

Dr. Law, of Cornell University, New York, one of the cattle commission of the United States, and a veterinary surgeon of celebrity, and who has had much actual intercourse with this disease, gives both stages of symptoms. They are of sufficient importance to repeat. In the insidious (slow) incubation, for some days, and frequently for a fortnight, a month or more, a slight cough is heard at rare intervals. It may be heard only when the animal first rises, when it leaves the stable, or when it drinks cold water, and hence attracts little or no attention. The cough is usually small, weak, short and husky, but somewhat painful and attended by some arching of the back, an extension of the head upon the neck, and protrusion of the tongue. This may continue for weeks without noticeable deviations from the natural temperature, pulse, or breathing, and without impairment of appetite, rumination or coat. The lungs are as resonant to percussion as in health, and auscultation (placing the ear next the lungs) detects slight changes only, perhaps an unduly loud blowing sound behind the middle of the shoulder, or an occasional slight mucus rattle, or a transient wheeze.

PRONOUNCED SYMPTOMS.

As the disease advances the animal becomes dull, more sluggish than natural, does not keep constantly with the herd, but may be found lying alone; breathes more quickly twenty to thirty times per minute in place of ten or fifteen, and retracts the margins of the nostrils more than formerly, the hair, especially along the neck, shoulders and back, stands erect and dry; the muzzle has intervals of dryness, and the milk is diminished. The eye loses somewhat of its prominence and luster, the eyelids and ears and the limbs are hot or alternately hot

and cold. By this time the temperature is usually raised from 103° F., in the slightest or most tardy cases, to 105° and upward to 108° in the more acute and severe. Auscultation and percussion also now reveal decided changes in the lung tissue. The ear applied over the diseased portions detects in some cases a diminution of the natural soft-breathing murmur, or it may be a fine crepitation, which has been likened to the noise produced by rubbing a tuft of hair between finger and thumb close to the ear. Where this exists it is usually only at the margin of the diseased area, while in the center the natural soft murmur is entirely lost. In other cases a loud blowing sound is heard over the diseased lung, which, though itself impervious to air and producing no respiratory murmur, is in its firm, solid condition a better conductor of sound and conveys to the ear the noise produced in the larger air tubes.

TESTS BY PERCUSSION.

Percussion is effected by a series of taps of varying force delivered with the tips of the fingers of the right hand on the back of the middle finger of the left firmly pressed on the side of the chest. Over all parts of the healthy lung this draws out a clear resonance, but over the diseased portions the sound elicited is dull, as if the percussion were made over the solid muscles of the neck or thigh. All gradations are met with as the lung is more or less consolidated, and conclusions are to be drawn accordingly. In other cases we hear on auscultation the loud, harsh, rasping sound of bronchitis, with dry, thickened, and rigid membranes of the air-tubes, or the soft, coarse mucous rattle of the same disease when there is abundant liquid exudation, and the bursting of bubbles in the air passages. In others there is a low, soft, rubbing sound, usually in jerks, when the chest is being filled or emptied. This is the friction between the dry, inflamed membrane covering the lungs and that covering the side of the chest, and is heard at an early stage of the disease, but neither at its earliest or its latest stage. Later there may be dullness on percussion, up to a given level on one or both sides of the chest implying accumulations of liquid in the cavity, or there is a superficial dullness on percussion, and muffling of the natural breathing sound with a very slight, sometimes almost inaudible, creaking, due to the existence of false membranes—solidified exudations—on

the surface of the lung or connecting it to the inner side of the ribs. Peculiar sounds are sometimes heard, as wheezing, in connection with the supervention of emphysema and others which it is needless to mention here. In lean patients pressure of the tips of the fingers in the intervals between the ribs will detect less movement over the diseased and consolidated lung than on the opposite side of the chest where the lung is still sound.

SECTION III.—VIOLENT SYMPTOMS OF PLEURO-PNEUMONIA.

The more violent forms of this disease, or, as it manifests itself during hot weather, are: The breathing becomes short, rapid and labored, and each expiration is accompanied by a deep moan or grunt, audible at some distance from the animal. The nostrils, and even the corners of the mouth, are strongly retracted. The animal stands most of its time, and in some cases without intermission, its forelegs apart, elbows turned out and shoulder-blades and arm-bones rapidly losing their covering of flesh, standing out from the sides of the chest so that their outlines can be plainly seen. The head is extended on the neck, the eyes prominent and glassy, the muzzle dry, a clear or frothy liquid distills from the nose and mouth, the back is slightly raised, and this, together with the spaces between the ribs and the region of the breast-bone, are very sensitive to pinching, the secretion of milk is entirely arrested, the skin becomes harsh, tightly adherent to the parts beneath and covered with scurf, the arrest of digestion is shown by the entire want of appetite and rumination, severe or fatal bloating, and later by a profuse watery diarrhoea, in which the food is passed in an undigested condition.

If the effusion into the lungs or chest is very extensive, the pallor of the mouth, eyelids, vulva and skin betrays the weak, bloodless condition, the tongue is furred and the breath of a heavy, feverish, mawkish odor, but rarely fetid; abortion is a common result in pregnant cows. During the summer the disease shows its greatest violence, and it is then that its mortality is not only high, but early. The great prostration attendant on the enormous effusion into the organs of the chest, the impairment of breathing and the impairment or suspension of the vital functions in general, causes death in a very few days. In other cases the animals die early from distension of the paunch with gas, while in still others the profuse

scouring helps to speedily wear out the vital powers.

WHAT TO DO.

As we have stated if the case is clearly pleuropneumonia (lung plague) in its contagious form, kill and bury. In mild cases, or in the first stages of the disease, Dr. Gamee, the well-known English veterinary surgeon, advises for an ox daily doses of sulphate of iron, linseed and anise-seed of each from one-half to one drachm, the whole to be well mixed and given in bran. The food throughout the disease should be light and nutritious.

In the second stage give copious warm water injections, and, as a stimulant two or three times a day, one-half ounce carbonate of ammonia and one quart linseed oil.

For the cough and debility during convalescence the following tonic, to be given daily, is advised: Oxide of magnesia, one-quarter ounce; iron filings, very fine, one-half ounce; tincture of gentian, one and a half ounces; rain water, one pint.

The cheapest and the most humane way is to kill every animal infected. Authorities all agree that with both lungs affected there is no hope of recovery, and the infection from an animal with one lung, or one lobe of a lung infected, is as deadly as though both of them were quite dead.

PREVENTING THE SPREAD.

In conclusion, it should only be necessary to add: The disease having appeared in your section of country, or if you suspect its existence in animals brought from a distance, have them examined by a duly qualified veterinary surgeon or report to the proper State authorities at once, and in the meantime isolate every suspected animal and keep them in quarantine until the surgeon has passed upon them.

SECTION V.—TEXAS (SPLENIC) FEVER.

Texas, or to call it by its true name, splenic fever is never found outside the track of droves of Texas cattle, or where there could have been no contact with Texas cattle. It can only be communicated by Texas cattle during their first season North, and the contagion is destroyed by the first general frosts of autumn, not to reappear again unless Texas cattle are again brought into the neighborhood. Native cattle contracting the disease do not communicate it to others; at least there is no well-authenticated evidence that such is the case. In its mortality it is

fully as fatal as the lung plague, ninety animals in a hundred dying, and remedial means, except in the earlier stages, proving of but little use.

THE SYMPTOMS OF SPLENIC FEVER.

One of the marked symptoms of Texas fever is a greatly accelerated pulse, from forty beats in a minute, the average for healthy oxen and cows, sometimes as high as one hundred and twenty beats in a minute. Another symptom is a decided increase of the animal temperature after the fever is fully developed; but this is generally preceded by a chill. The excretions from the intestines and bladder are diminished in quantity and usually high-colored or bloody; the secretion of milk is nearly suspended. A yellow mucus is discharged from the mouth and nostrils, the animal has a dejected look, hollow flanks, and arched back, an unsteady gait and a rough coat. Many of these symptoms are also common to other cattle diseases. There is no evidence of disease of the lungs or air passages; but little that is unnatural can be found in the first three stomachs; the fourth stomach usually shows congestion, and the intestines are still more engorged and blood stained. The liver is not often materially affected, but the gall bladder is almost always filled with dark-colored and thickened bile. The spleen is always enlarged; in health it weighs in mature animals from one pound to a pound and a half, while in cattle that die of Texas fever it sometimes weighs as much as eight pounds. The kidneys are congested and their secretion in the bladder is bloody or blood-stained.

The organs principally affected are the fourth stomach, the spleen, and the bowels, and the period of incubation varies from four to six weeks. There is slight fever, dullness, drooping of the head, glassy and watery eyes, arched back, loss of appetite, cough, trembling, increased heat of the system, the urine becomes highly colored, and then very dark, the mouth and rectum become a dark red or copper color, the dung is hard, and sometimes coated with blood. The animal continues to get worse and worse, and at length dies in a stupor or convulsions. Treatment has not been found effectual. If taken early, and the animal removed to a clean pasture, it is recommended to give them two or three times a day one-half ounce chlorate of potash, one ounce tincture of chloride of iron, in a quart of water, and if there is

much weakness, to stimulate the system freely with whisky. As soon as the animal begins to mend, light and nourishing food should be allowed, and the following tonic twice a day: One-half ounce of sulphate of iron and one ounce of tincture of ginger, in a quart of water.

Prof. Gamgee, who made an exhaustive examination of Texas fever for the United States government, upon the outbreak of the disease in the West in 1868, advises shelter, friction of the limbs, the bowels to be moved by injections and ounce doses of laudanum during the first few days, to be followed by stimulants of one-half ounce of sulphuric ether, four ounces of solution of acetate of ammonia, given in a quart of linseed tea or water, three times a day. But the disease, where introduced by Texas cattle, is so deadly that little can be done, once it makes its appearance, except to prevent its spread.

SECTION V.—ABORTION IN COWS.

Abortion in cows, once it occurs, is often thereafter to be looked for at about the same period of gestation. It is caused by a number of natural causes, as smutty hay or grain; hot, confined stables; violent usage and especially violent blows by brutal stablemen; by slipping on ice or falling on frozen ground; by purging, by the use of stimulating condimental food, by teasing of the bull and especially from sympathetic action from one cow to another.

THE SYMPTOMS.

Watch for loss of appetite, partial or totally ceasing to chew their cud, listlessness, an inclination to lie down, unwillingness to move, weakness, and diminution in the flow of milk. Later the animal will moan, and give other signs of distress, until the difficulty is removed. If the cow is restless, refuses food, paws the floor, rests her head with a tired action on the manger, and especially if there be a glairy discharge from the vagina remove her at once from all other cows.

The fetus and attachments being expelled sprinkle all with carbolic acid or cover with quick lime, and bury deeply. Keep the vagina of the cow cleansed with dilute chloride of lime water and give nourishing food as soon as the animal will eat.

Every part of the stable must be thoroughly fumigated, and every part that has come in contact with the excretions of the cow must be washed with pure carbolic acid, one part, to fifty of water; and afterward whitewash. A cow once having aborted it is

better to fatten her for the butcher unless she be more than ordinarily valuable.

THE RULE IN CONTAGIOUS DISEASES.

If a disease is suspected to be contagious isolate the animal and communicate with a veterinary surgeon at once. Abortion may be successfully treated by any farmer. The other contagious diseases named are not successfully treated by the best veterinary surgeons, hence the advice is to kill, bury deeply and thoroughly fumigate, and disinfect otherwise, every place that may have been contaminated.

SECTION VI.—OTHER CONTAGIOUS DISEASES.

The other contagious diseases of cattle specially worthy of mention here are rinderpest and foot and mouth disease. Rinderpest is a most dreaded disease, known from time immemorial on the continents of Europe and Asia, but never yet in America. (The late so-called outbreak in Kansas was not foot and mouth disease, but ergotism, deadly, but not true foot and mouth disease.) It is one of the most virulently contagious diseases that has ever devastated cattle.

RINDERPEST.

Rinderpest is a contagious typhoid fever, the germs of which remain vital for some time in the clothes of persons, any offal manure or litter of any kind, the clothes of persons connected with the cattle, and even the dogs of the farm, rats, mice, and even game animals. Fortunately we have never had this disease introduced into the United States, statements to the contrary notwithstanding. The death rate in herds attacked is from sixty even up to ninety-five, and no remedies have been found availing. The fact that we have never imported this disease is probably due to the fact that it has never appeared in Great Britain of late years. Since we have imported cattle largely from Europe the various countries have used the most stringent means to prevent its being re-established.

EPIZOOTIC APHTHA, OR FOOT AND MOUTH DISEASE.

This is another disease that, although introduced not long since on our seaboard, was eradicated. It may be as easily introduced again, and if it becomes once disseminated it will be difficult to eradicate, since it attacks sheep and swine as well as cattle. For this reason a pretty full description of the symptoms as well as the curative measures will be necessary. In this and other cattle diseases treated of

we follow Clater's English work as an authority on the subject of diseases of cattle.

SYMPTOMS OF VESICULAR APHTHA OR FOOT AND MOUTH DISEASE.

The early signs are a shivering fit, succeeded by slight dullness, staring coat, husky cough, elevated temperature, with increased frequency and hardness of pulse. If the animal is in the pasture it will,



Appearance in the Foot and Mouth Disease.

in all probability, be found away from the companions. The appetite is capricious, tenderness is evinced upon pressure over the back and loins; febrile signs are present, and an increased flow of saliva takes place, which becomes rosy from an admixture with mucous; and an uneasiness is evinced by frequent movement of the jaws. If the mouth be examined vesicles will be observed on the tongue and membrane generally. These vary in size from a pea to half a crown, and in a few hours burst their contents with an admixture of blood, giving color and consistence to an aggravated flow of saliva, while the raw and sensitive surfaces cause great pain and smacking of the lips. In some instances the feet are attacked, and this may occur before any signs of disorder appear in the mouth, or not be observed except in conjunction with or until that period has passed. When vesicles form on the coronets and between the digits, great pain and swelling accompany the disorder; the animal kicks or shakes the feet when made to walk, or lies persistently and suffers for a time from acute fever. The vesicles soon burst and discharge their contents, and the various surfaces are possessed of an increased sensitiveness, while severe lameness adds greatly to the embarrassment.

In ordinary cases the raw surfaces are speedily covered by epithelium, their sensitiveness rapidly decreases, the lameness and flow of saliva gradually disappears, the pulse becomes slower, fuller, and softer, breathing regular, temperature gradually falls to the standard of health, the appetite returns, and general functions restored, except, perhaps, the milk, which frequently suffers permanent diminution; and from the tenth to the fifteenth day after the attack

the animal is convalescent. This is the course of common cases: now to notice the aggravated forms.

Milk cows frequently suffer violently. In addition to the ordinary signs already observed, the surfaces of the teats and udder are involved in the vesicular eruption; the gland within is also affected by the animal poison, and is hot, tender, and swollen. In the process of milking, or through the sucking of the calf, the vesicles are burst, raw surfaces are exposed, and the operations prove a source of irritation which the animal resolutely endeavors to avoid. This leads to a retention of milk within the udder, and it becomes an additional cause of irritation, and even inflammation. In common with the ordinary febrile signs, pain and agony, consequent upon the disease, located in the mouth and feet, the lungs are apt to become congested, breath fetid, eyes blood-shot; sloughing of parts within the mouth, and even on the lips and within the nasal passages, occurs, and blood is mixed with the discharges; abscesses form in the udder, sloughing occurs also there, or portions of the secreting parts are destroyed by deposition of lymph, becoming what is termed "a blind quarter." In other instances mortification takes place, and the part comes away. The feet suffer no less: swelling, inflammation, sloughing, etc., proceed, and expose the bones, etc., beneath, while all attempts at reparation are slow and abortive. During the development of these states the animal loses condition rapidly; the assimilative organs are more or less involved, and nutritive material is no longer passed into the blood; it therefore becomes thin and watery, and, in consequence, the heart-beats are heard as unusual sounds at some distance from the side of the sufferer. The pulse is rapid, small and feeble; it at length grows indistinct and imperceptible, and a condition of hectic is established, the animal suffering from diarrhoea, and often suddenly dies at periods varying from one to two or three weeks from the attack.

Young animals drawing their nourishment from the teat suffer acutely from the disease attacking the mouth, fauces, gullet, and digestive canal throughout. They then can take no food, and weakness becomes excessive. Colicky pains with diarrhoea and violent straining are the prominent signs, in addition to the eruption in the mouth and upon the feet, from which the little creature succumbs in a few hours. Under these circumstances milk supplied to other animals

should, if possible, be boiled, by which its pernicious properties will be destroyed.

TREATMENT.

In the simple eruptive form, as soon as the vesicles are observed, let each receive a drench composed as follows:

Take of Epsom Salts,	8 oz.
Ginger and Gentian powdered, of each,	2 oz.

Mix these with one-half pound of treacle and a quart of strong ale, and give to a large cow, etc.; three-fourths or one-half may be given to lesser animals and year-olds; one-third for calves up to eight or ten months; and one-fourth for sheep. This is of great consequence: large doses must be avoided, as purgation cannot be endured.

The mouth is to be washed twice daily with the mixture thus arranged:

Take of Alum in fine powder,	1 oz.
Tincture of Myrrh,	1 fluid oz.
Water,	1 qt.

It is a good plan to open the vesicles as soon as possible with the knife or lancet, by which the healing action is more actively promoted, and greater benefit derived from the application.

If matter forms in the neighborhood of the hoof, all detached portions should be carefully removed, and the parts dressed daily with a mixture compounded after the following arrangement:

Take of Tincture of Myrrh,	2 oz.
Butter of Antimony,	1 oz.

Mix, and apply to each sore by means of a feather, or piece of tow placed upon a stick. In the hands of the practitioner various compounds are improvised with the mineral acids, metallic astringent salts, etc.

If weakness supervenes, diffusible stimulants, as ammonia, brandy, etc., must be given, in which a little ginger and gentian should be placed. When febrile symptoms prevail, small doses of the sulphate or nitrate of potash are usefully combined with tonics, in the following proportions:

Take of Sulphate or Nitrate of Potash,	$\frac{1}{2}$ oz.
Sulphate of Iron,	2 drs.
Ginger,	$\frac{1}{2}$ oz.
Gentian,	$\frac{1}{2}$ oz.

Mix, and give daily, or morning and evening, according to circumstances, in porter or ale.

Promote the maturing of abscesses by hot water, poultices, blisters, etc.; keep all suppurating surfaces clean, and apply such dressings as are here given:

Take of Chloride of Zinc,	2 drs.
Tincture of Myrrh,	1 oz.
Water,	1 pt.

or,

Take of Crystallized Carbolic Acid,	$\frac{1}{2}$ oz.
Glycerine,	6 oz.

Dissolve, and add

Tincture of Myrrh,	1 oz.
Water,	1 pt.

or,

Take of Solution of Permanganate of Potash or Condyl's Fluid, a teacupful.	
Water,	1 qt.

This must be compounded as required, and is useful for destroying the smell, as well as promoting the healing action of wounds. Either of the other formulas may be kept in bottles for use.

As soon as the animal is able to take nourishment, hay-tea should be liberally provided; mashes of barley, malt, oats, with a little linseed to promote the proper action of the bowels, are also of absolute necessity. When they can be had, green clover, grass, carrots, swedes, etc., are also valuable; in fact, whatever can be taken to furnish support should be allowed, having due regard to nutrition, easy digestion, avoidance of constipation, or overloading the stomach, etc.

The cleanliness and ventilation of buildings, with good beds, should especially be provided, and, in order to protect the spaces between the digits from irritation, as frequently occurs by the insinuation of straws, dirt, etc., the feet may be bound up after being dressed by rugs, etc., as shown in the accompanying drawing.

When the udder is affected and the abstraction of milk difficult, insert the teat-syringe in order to empty the gland without aggravating the pain and inflammation by the motion consequent upon employing the hands only. Afterward inject by means of a glass syringe a weak alkaline solution, such as is given below, in order to neutralize the acidity consequent upon the morbid action within:



Mode of Applying
Dressings Between
the Hoofs.

2 drs.
1 oz.
1 pt.

$\frac{1}{2}$ oz.
6 oz.

1 oz.
1 pt.

acupful.
qt.

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of Applying
stings Between
Hoofs.

the morbid

Take of Carbonate of Soda or Potash, $\frac{1}{4}$ dr.
Water, 8 oz.

Mix, and when dissolved the solution may be used.

It is not necessary to inject a large quantity, the syringe discharged once or twice being sufficient for each teat. A little practice is necessary for the operation, as the movements must be delicate, otherwise total failure results. The syringe being filled, the teat is carefully held between the first and second fingers of the left hand, so as to turn the point and orifice toward the operator. The syringe is held in the right hand between the first and second fingers, while the thumb rests upon the piston-rod in order to push it downward. The point of the syringe is then placed lightly upon the orifice of the teat, and by pressure emptied, the fluid passing readily into the gland-ducts.



Test Syphon.

If the udder is much inflamed, common elder ointment with camphor may be rubbed in upon the outside. The extract of belladonna also is an efficient remedy. It should be thus compounded:

Take of extract of Belladonna, 1 oz.
Hog's Lard, 6 oz.

Mix by means of a spatula on a marble slab, and anoint the parts daily, with as much friction as can be borne.

Indurations may be treated afterward by iodine or mercurial ointment, as preferred.

SECTION VII.—EPIDEMIC DISEASES.

The principal epidemic diseases to which cattle are subject, are catarrhs, colds, and other diseases of a like nature. Malarial diseases sometimes become so rife that they are called epidemic, but they are really confined to narrow localities, and when found, stock should be at once removed to higher and dry pastures.

INFLUENZA OR CATARRH.

Catarrh is an inflammation of the lining membrane of the nostrils and sinuses of the head, and in severe cases extending to the eyes, throat and air passages. Its causes are principally atmospheric, but the disease is intensified by badly ventilated and dirty sta-

bles, deficient drainage, or exposure in unsheltered situations.

SYMPTOMS OF CATARRH OR INFLUENZA.

The mucous membranes of the eyes and nose are at first dry and reddened, but in a few hours they become moist and discharge a thin watery secretion, which is eventually dense, opaque, and copious. The eyelids are tumefied, and increased heat is manifest in the bones of the forehead. The animal sneezes, and not unfrequently there is cough. Febrile symptoms sometimes run high, and a repetition of such attacks terminates in pleuro-pneumonia of the sporadic form. A simple state of diarrhoea sometimes occurs. The progress of the disease is accurately betokened by the nature and rapidity by which the discharge is promoted. If it is scanty and tardy, the fever is generally severe, consisting of difficult breathing, loss of appetite, suspension of rumination, rapid and hard pulse, constipation, deficient urine, etc., all of which are doubtless preceded by shivering-fits and a staring coat. If in a day or two the discharge increases, becomes purulent and copious, fever is diminished, and recovery speedily follows; but if the system is still exposed to the causes that induced the disease, the terminations may be chronic nasal gleet, malignant catarrh, or sporadic (non-contagious) pleuro-pneumonia.



Simple Catarrh.

TREATMENT.

If diarrhoea is present, administer at once the following:

Infusion of Quassia, 1 pt.
Tincture of Opium, 1 oz.
Aromatic Spirits of Ammonia, 1 "

Mix.

When the bowels are constipated, a gentle laxative will be required. This may be composed of the subjoined ingredients.

Epsom Salts, 12 to 16 oz.
Ginger and Gentian, powdered, of each, 1 oz.

Mix, and administer in one quart of warm ale.

The animal should be removed to comfortable quarters, or at least from all exposure to the influences that have caused the affection. The skin should be stimulated by smart friction and even clothing when necessary. The food should consist of bran-mashes, roots and green food when they can be obtained; and with such a diet daily doses of some neutral salts are of great service in reducing the fever.

Sulphate of Potash,	2 oz.
Water,	1 pt. to 1 pt.

Mix, and administer morning and evening during the existence of the fever. When the signs indicate a reduction of that state, the dose may be gradually decreased, and finally discontinued on their disappearance.

If matter (pus) is thrown out, it should be assisted by all means. This may be done by allowing the animal to inhale steam from chaff or cut hay saturated with boiling water, or better, a jet introduced under a bottomless bag fastened to the head of the animal. If great depression follows the first attack, especially if diarrhoea is present, stimulants will be indicated, and the action of the heart must be controlled. The following will be found useful:

Aromatic Spirits of Ammonia,	2 oz.
Extract of Belladonna,	12 drachm.

Rub the belladonna down with water until it forms a thick emulsion, then add the ammonia, mix in a pint of ale and administer two or three times a day.

SORE THROAT.

Whether this exists independently or in connection with catarrh it must be attended to. Move the bowels by injections, but give no medicines by the mouth. Some of the following laid well back on the tongue several times a day will be excellent.

Muriate of Ammonia,	2 oz.
Camphor,	1 oz.
Gum Kino,	1 oz.

Reduce each of the ingredients separately to powder, mix intimately and incorporate with one pound of molasses or enough to make a thick mass. If the catarrh or sore throat assume the malignant form a veterinary surgeon should be sent for since the symptoms are various and often quickly fatal. In both cases it is a specific blood disease.

CHAPTER XI.

PARTURITION AND MAMMARY DISEASES.

SECTION I.—PARTURITION

The act of parturition if natural is usually performed with little difficulty in domestic animals. If regular exercise and proper feeding have been given, assistance will seldom be needed, except in those cases where accident has intervened to make a false presentation. The natural presentation alone is that in which the head and fore feet are presented, and with the back of the calf toward the back of the mother. Any other presentation presupposes danger to the cow, and the first effort is to present the calf properly.

THE VARIOUS FALSE PRESENTATIONS.

The first wrong presentation is where the calf lies naturally except that only one fore-leg is presented with the nose and the other turned back. Any person with small hands can easily rectify any false presentation by the use of care and judgment. Do nothing hastily. Whatever the presentation do nothing hurriedly. The danger is not in delay so much as in undue haste. In any false presentation wait until the efforts at expulsion have passed, then with a well oiled hand push the head back, find the missing leg, and bring it to its proper place as gently as possible, when, unless the calf is abnormally large, the cow will deliver herself. If assistance is necessary introduce the two hands well oiled, and with the tips of the fingers grasp the calf just back of the ears. Wait for the effort of the cow at expulsion, and assist it by pulling, and at the same time withdrawing the hands. This plan, carefully and persistently followed up, will generally accomplish the desired result, and without injury to cow or calf. The writer has never failed thus to deliver the calf except in one instance when the calf was so large that it had to be dissected as to its shoulders before delivery. There is no special objection, however, to attaching a cord to the fore-legs that an assistant may assist by moderate pulling under the direction of the operator.

SECOND MAL-PRESENTATION.

The second mal-presentation is when the head only is visible. Push the head back, find first one leg, bring it into position, then the other and deliver as heretofore stated.

THIRD MAL-PRESENTATION.

Here one leg will be presented, or both, but the head will be turned under or to the side backward.

First, place the fore-legs in proper position, attach a cord to each, push them back, bring the head to its proper position between them, when the delivery is made as previously stated.

FOURTH MAL-PRESENTATION.

The calf lies upside down; that is with the belly and feet toward the cow's back. It is difficult to operate. Raise the hind parts of the cow with large, soft bags of straw or chaff. Introduce the hand with a cord having a loop in one end, pass it around the fetus just back of the shoulders, pass the end through the loop, draw it tight, and while an assistant holds the end of the cord, use the cord around the body to assist in getting a leverage in turning the calf by the hand and arm introduced as far as may be necessary into the womb.

REVERSE PRESENTATIONS.

Presentation of the hind-quarters is the most difficult to handle. The fetus is difficult to turn, and the best way is to bring it into a position by which the calf will lie as in the natural presentation, except that the hind feet are first. Then deliver by disengaging the pelvis as much as possible with the hands, and drawing them back gradually when the cow strains, an attendant pulling meanwhile on the cord.

There are a number of backward false presentations, as given in the forward false presentations. Before delivery is attempted, the presentation must be made to correspond to that given in the paragraph preceding this. In every case of difficult labor from false presentation, water in the head (hydrocephalus), or water in the abdomen (ascites), the services of a competent veterinarian should be secured if possible. In the first case the head of the calf must be pierced to let out the water, and in the other case the abdomen must be pierced.

RETENTION OF THE PLACENTA.

In healthy parturition the placenta (called after-birth) comes away naturally. It may be more or less delayed, and if so the parting may be assisted; with a dry cloth hold the umbilical cord, and at every three pull gently, and hold what you have gained, until the whole comes away. To assist this let the cow be littered down with her fore feet considerably higher than the hind feet.

The proper way to remove the placenta, when it is retained from abortion, weakness, or other unnatural causes, is to pass the well oiled right hand

and arm into and through the passage into the uterus, keeping the ends of the fingers well together, the back of the hand up, covering the membranes. Then, holding the placenta in the left hand, with gentle pulling, pass the right hand to the several centers of attachment (called cotyledons) of the placenta to the womb, which should be gently pressed with a rolling motion of the fingers to disengage them successively, but violence must be guarded against. If the cotyledons are torn from the womb, fatal bleeding may result.

FLOODING.

This is called uterine hemorrhage, and is entirely distinct from the vaginal hemorrhage, occasioned by injury to the passage in parturition. In vaginal hemorrhage the stream is small and trickling, and if it continues unduly after the removal of the placenta, cold water injections will generally suppress it.

In flooding, however, the blood is discharged with force and in large quantities. The animal strains, standing with arched back and feet drawn together with moaning and grinding of her teeth. The blood, when expelled, is in a semi-coagulated state from lying in the womb. The first means to be used is to hold the hand in ice water until quite cold, and then, upon being passed up the orifice, contraction will follow and the bleeding cease. If not, try injections of cold water and apply ice to the loins, or pour cold water slowly over the loins and inject cold water into the womb.

SECTION IX.—DISEASES FOLLOWING PARTURITION.—INVERSION OF THE WOMB.

Sometimes, from various causes, the womb is inverted or turned inside out and protruding. Place the animal in a stall with the hind feet much higher than the fore feet. Then, by the exercise of gentle pressure, the fingers surrounding the mass as much as possible, press the whole back. If it has become dirty it must be fully cleaned with warm water and with care before putting back. A truss or compress should be placed over the parts (with an orifice to allow the escape of fluids), to hold all in place. This compress may be prevented from slipping by side lines and a band along the back running to a surcingle and breast strap. Unless the cow is very valuable, she had better be fattened rather than kept for further breeding.

SECTION X.—PUERPERAL FEVER.

This and parturient apoplexy are difficult to dis-

tinguish one from the other, except by a professional veterinarian. If there has been difficult calving, extremes of temperature, retention of the placenta, or over-exertion before calving, puerperal fever may be suspected, especially so if the cow has been given extra food, before calving. The disease is an erysipelatous inflammation of the uterus and abdominal organs, and occurs from twelve hours to four days after calving.

The early symptoms are suspension of rumination, restlessness from fever, pulse full, hard and rapid, the temperature high and urine and feces checked. Later there will be colicky pains, kicking of the belly, frequent lying down and rising up, with resting on the knees, and when down the limbs will be frequently drawn up and again thrust out. The head will be turned to the flank, respiration quick and

nervous force excited by hypodermic injections; but this must be done by a professional veterinarian. In two hours after giving the purgative drench, give

Acetate of ammonia,	4 ounces.
Tincture of aconite,	20 drops.

Mix, and give in a pint of warm gruel. At the end of four hours repeat the dose, and every four hours thereafter until the pulse is improved. If there is coma (stupor) and a very quick pulse the cow will probably die.

SECTION VII.—PARTURIENT APOPLEXY.

This is a blood disease often mistaken for puerperal fever. It is common in deep milkers and heavy fleshed cows. If immediately after calving the cow is disinclined to move, if there is a staring look out of the eyes, if the milk secretion is checked, if there is quickened pulse and respiration, with increased



Posture of the Cow in Parturient Apoplexy.

the pulse small and wiry. If the cow is of full habit take away some blood, if the disease is known in its earlier stage, but do not reduce the pulse. Put a mustard plaster over the belly, and give the following drench:

Epsom salts,	24 ounces.
Calomel,	2 drachms.
Croton oil,	20 drops.
Pulverized ginger,	2 ounces.
Molasses,	1 pint.
Gruel,	2 quarts.

Mix, and give by letting it trickle down the throat slowly. Follow the drench with copious injections of weak soapy water. Keep warmly clothed, and rouse the action of the skin with rubbing. Induce purgation by every possible means. If no operation of medicine is had in ten hours, from a pint to a quart of water may be injected into the veins and

heat generally, lose no time. It is the first stage of the disease. The second stage, except to experts, is the one first noticed. The cow shakes her head, totters and staggers in walking, and shortly drops to the ground unable to rise. The eyes are bloodshot, fixed, and glassy, and almost insensible to the touch—she is nearly blind—the pupils are dilated, and the eyelids twitch violently; the pulse is full but soft, with a frequency considerably below that found in the first stages. Animal heat is not above 102 or 103° F.

The third stage rapidly succeeds. The mucous membranes assume a dark purple hue, and the animal is totally blind. The head is probably turned backward on the shoulder, or is dashed from side to side, in great danger of breaking the horns or of hurting those in attendance. The pulse becomes

slow, tardy, and infrequent, scarcely numbering more than twenty-five or thirty beats, and then gradually rapid, feeble, smaller, and at the end imperceptible. The breathing is slow and roaring (stertorous) and even difficult, and the pupils are now contracted. Animal heat rapidly declines, reaching as low as 95° F., and the horns, ears, and extremities are cold as clay. The udder is no longer soft and flaccid, but hard, turgid, and unyielding; convulsions set in and death ensues.

In this disease prevention is better than curative means. Cows predisposed should not be stimulated before calving, neither should they be allowed to be costive, and the udder should be kept drawn when it fills. At the first symptom bleed, but not if the secondary or real symptoms are really pronounced.

Attend carefully to the nursing and comfort of the cow. About two and a half hours after giving the cathartic give the following, and repeat it at the same intervals until a change for the better is indicated:

Aromatic Spirits of Ammonia,	4 oz.
Gentian, pulverized,	1 oz.
Ginger, pulverized,	1 drachm.
Ale or cold Gruel,	1 pint.

We have the same advice to give in this as in the preceding. Cows, once recovered, fatten for the butcher.

SECTION VIII.—NERVOUS DEBILITY.

This is often confounded with parturient apoplexy. As a rule it is not fatal. It does not necessarily follow protracted labor in calving, and is quite as often seen in lean, but good milkers, as in



Milk Fever and Nervous Debility.

The bowels must be acted upon at once. Give the following dose for a cow of the largest size, and be sure it reaches the fourth stomach by letting it trickle slowly down. If the animal is insensible, it must be given, if at all, with a stomach pump:

Epsom Salts,	24 oz.
Calomel,	2 drachms.
Croton Oil,	30 drops.
Powdered Ginger,	2 oz.
Syrup,	2 pounds.

Mix in two quarts of gruel.

If gas forms after the medicine has been taken, a probang should be passed down the throat to allow its escape. Give injections of warm soapsuds every fifteen minutes to induce the operation of the cathartic; draw off the urine by means of a catheter; apply ice to the head, and keep the milk drawn from the udder.

animals of high condition. There is neither high fever, stupor, nor any tendency thereto. Although the pulse may be somewhat accelerated, it is compressible and frequently weak. The udder is soft, milk readily drawn from it, and the quantity plentiful. Constipation is more or less present; stomach full, but the appetite and spirits continue unimpaired. The animal remains in a natural position of rest (see cut), the ears are active, held and carried properly, and the utmost anxiety is manifested if the calf is taken from her sight. There is a tendency to coldness of the surface, and sometimes also of the extremities, which denotes a want of proper tone in the capillary circulation. Large cows, those having unusual visceral capacity, and others breeding from large bulls, are commonly affected. In such animals the great demand for blood for the support of

the fetus, and change of structure which the womb undergoes in pregnancy, proves a powerful exciting cause.

The bowels must be attended to. Prepare the following

Epsom Salts,	1 pound.
Powdered Aloes,	4 drachms.
Powdered Ginger,	2 drachms.

Dissolve in hot water, and when cool enough to administer, mix with enough warm linseed tea or gruel to make two quarts. Keep the animal warm with blankets; apply along the spine from the withers to the hips the following embrocation:

Soft Soap,	2 oz.
Extract of Belladonna,	2 drachms.

Rub together in a mortar and add,
Alcohol, $\frac{1}{2}$ pint.

Apply this as directed, well rubbed in along the spine twice a day; or better, heated in by passing hot flat-irons over the back when covered with a blanket. The drinking water should be tepid, and sloppy but nutritious food should be allowed. Hay tea is excellent in place of water if the cow will drink it.

SECTION IX.—MAMMITIS OR GARGET.

Garget if taken early yields generally to treatment—such as fomentations, and relieving the system by action on the bowels. The first stage is simply inflammation of the udder, but it may be complicated with other diseases, especially rheumatism, even in cows giving no milk.

THE SYMPTOMS.

A shivering fit is usually observed in the first instance, which is soon followed by considerable fever and dullness. The bag becomes hot, swollen, and tender; milk decreased, bowels constipated; and the animal is averse to having the operation of milking performed.

These signs subside somewhat, but the udder becomes painfully hard in one or more parts, resembling internal tumours, and continues swollen. The milk extracted is curdled, and frequently blood is found in it.

Shortly these hardened parts become soft and fluctuate; pus is present, and probably discharged with the scanty portions of milk. At other times the abscesses suppurate externally; or, the disease stopping short of suppuration, the bag or quarter remains hardened or indurated, and no longer capable of giving milk.

TREATMENT.

Simple mammitis in the first stage is amenable to treatment; after that, much trouble is involved and disappointment contracted. Let the animal be attended to at once. Supply a good bed, and shelter from cold and wet. Give the following:

Take of Epsom Salts,	1 pound.
Ginger,	1 oz.
Molasses,	1 pound.
Warm Water,	1 quart.

Mix.

Next institute fomentations; hot water should be

applied incessantly for three or four hours, and at the close let a large hot bread and milk poultice (110° to 115° F.) be ready for application to cover the



Support for the Udder.

whole udder, and support it by means of a broad bandage over the back, as shown in the annexed figure. If the constitutional disturbance continues take:

Solution of Acetate of Ammonia,	4 ounces.
Fleming's Tincture of Aconite,	20 drops.
Water,	$\frac{1}{2}$ pint.

Mix, and give immediately.

At the end of four hours the draught is repeated, and at the lapse of each succeeding period of four hours ten drops are to be given, with the same quantity of ammonia as prescribed. The aconite must be withdrawn as soon as the pulse is reduced and symptoms denote greater quiescence, and half a drachm of the extract of belladonna substituted; the draught being administered twice a day only.

Open any abscesses, when formed, immediately, and dress the wounds with lotions, as enumerated below.

Chloride of Zinc,	1 drachm.
Water,	4 pints.
Dissolve.	
Solution of Perchloride of Iron,	2 drachms.
Water,	2 pints.
Dissolve.	

Draw away the milk by means of the teat syphon, page 257, and use injections of weak solutions of carbonate of soda or potash, by means of a small glass syringe.

The addition of two or three drachms of extract of belladonna to the poultice is frequently conducive

to a favorable termination in the early stages. When portions become hardened, the following ointments may be used with a good deal of friction:

Soft Soap,	1 pound.
Mercurial Ointment,	1 oz.
Camphor Ointment,	4 oz.
Extract of Belladonna,	4 drachms.

Mix, and apply once a day; or, in lieu of this:

Tincture of Iodine,	6 oz.
Tincture of Opium,	2 oz.
Soap Liniment,	4 oz.

Mix, and apply with hand rubbing two or three times a day. It may be also advisable to give the following internally morning and evening:

Take of Iodide of Potassium,	2 drachms.
Gruel,	1 pint.

Dissolve.

In all cases the milk should be drawn regularly and effectually, and where practicable and the inflammation is not great, the calf may be put to suck. Sometimes, when the udder is hardened in one or more quarters, dry friction will cause it to become softer; but care must be exercised in order not to excite a fresh inflammation.

The milk during this disease is not fit for human use, and in advanced stages not so for animals. A cow once affected had better be fattened as soon as possible.

CHAPTER XII.

PARASITES OF CATTLE.

SECTION I.—SKIN PARASITES.

There are a number of species of cattle lice. The calf louse is also distinct. One species of cattle lice inhabit the regions about the root of the tail and thighs, and another the shoulders. They seldom give trouble to those who properly care for their animals. Maggots also sometimes infest ill cared for wounds and injuries.

Cattle, from their habit of licking themselves, should never be rubbed with poisonous substances. One of the best preparations for lice is a strong solution of tobacco, with as much salt added as it will dissolve. If the skin is fully moistened with this three times, at intervals of three days each, it will kill not only lice, but the nits as they hatch.

Equal parts of linseed oil and kerosene are also effectual in the generality of cases.

For putrid wounds infested with maggots, a weak solution of carbolic acid is proper. Ticks should be killed, not by pulling them away, but by snipping

them in two and touching the head part with the point of a feather dipped in turpentine.

SECTION II.—BURROWING PARASITES—WARBLES.

The ox gad fly (*estrus bovis*) deposits its eggs along the backs of cattle, which, in time, form tumors called warbles, sometimes as large as a hickory nut. Cattle instinctively fly from them and seek the shade of a wood. Dark shelter should be provided where the gad fly abounds. When the warbles are found they may be forced out through the skin by squeezing upon each side with the thumbs. A little tincture of aloes and myrrh may or may not be injected into the orifice.

SECTION III.—INTESTINAL WORMS.

Sometimes cattle are troubled with intestinal worms. This may be known by the general unthrifty appearance of the cattle, principally under-aged cattle. Often they will be found in the excrement.

Salt should be given such animals liberally, for a week or ten days. Then give the following, and repeat in a week:

Linseed Oil,	1 pint.
Oil of Turpentine,	2 ounces.
Infusion of Quassia,	1 pint.

Mix, and give in the morning, before feeding.

This is a dose for a full grown animal. Yearlings will require half the quantities, and six-months' calves one-third.

SECTION IV.—RINGWORM IN CATTLE.

This is rarely found in cattle, but is communicable from one to another.

It is generally found on the head and neck, especially on the forehead, face and eyelids. It shows an irregularly circular form, having broken or stumpy hairs, scales and imperfectly formed scales.

The cut shows the appearance correctly. It is caused by a fungus, *herpes tonsurans*.

The cure is to separate all afflicted animals from the well ones, to cleanse the sores with carbolic soap and water, and apply chloride of zinc, or oxide of



Ringworm in Cattle.





zinc ointment; or wash the ringworm with solution of nitrate of silver.

CHAPTER XIII.

THE COMMON DISEASES OF CATTLE.

SECTION I.—ABOUT BLEEDING.

It used to be the rule years ago to use the fleam in all cases where inflammation was suspected, or plethora, and in the spring it was not unusual for the farmer to make a general practice of bleeding the farm stock generally. It is not now used, except in cases where it is necessary to reduce the action of the heart. Formerly cattle men bled where a vein could be found. Now only the jugular vein is used for bleeding, and a large fleam is used to promote a rapid flow,



Steer Prepared for Bleeding.

and thus get rapid depression of the action of the heart. Since bleeding is only to be used in a very few cases, it should, if possible, be done under the advice of a veterinary surgeon or the family physician.

Since the jugular vein in cattle is loosely situated under the skin and large, it is not easy to secure it with the fingers for bleeding. Hence a cord is used, tied next the shoulder to raise the vein, and so that it may be instantly freed when desired. The figure shows the preparation of the animal for bleeding.

The horns are held by an assistant, and as soon as the requisite conditions are established, the blade of the fleam is placed in line with the vein upon the skin at the spot indicated in the drawing, and being struck smartly, enters the vessel, and blood flows at once. A large fleam should always be employed, that the essential rapidity and abundance of flow may be secured, which, when accomplished, is arrested by removing the cord. The next step is to close the wound by the common twisted suture. This is done by passing a pin through the lips of the orifice, in the skin only, and at the center, and winding round it soft twine or tow in the form of a figure 8, as shown on page 198.

SECTION II.—CANCEROUS ULCERS.

There are various cancerous ulcers and tumors of

the head—some movable, some fixed, and others implicating the bone. These generally all go under the name of big head. The true big head, however, is where the bone is involved. These complications are known under the various names of *osteæ sarcoma*, *spina ventosa* and fibro-plastic degeneration of the bone. These are long in forming, and often a simple tumor may become cancerous by bad usage. Any tumor of the head or jaw, if it do not yield to simple poulticing, as in the case of boils, and shows signs of permanency, the animal had better be fattened at once. Cancer cannot be cured; and once the horns are involved, speedy worthlessness follows. Breeding animals especially should be fattened, for there is good ground for supposing that the taint may extend to the offspring. The cut shows the formation of the tumor wherein the superior maxillary bone is implicated.



Cancerous Ulcer or Big Head.

As a means of bettering the condition of the animal until it is fattened, cleanliness, ventilation and attention to the food is necessary. An iron tonic will also be indicated.

Take.

Saccharized Carbonate of Iron,	2 drachms.
Powdered Columbo,	2 drachms.

Mix, and give twice a day in the early stages of the disease for ten days or two weeks; omit for a week and then recommence. If there is an abscess it should be opened.

Then take:

Butter of Antimony,	1 oz.
Tincture of Myrrh,	2 oz.

Mix, and inject from a glass syringe once daily. It should be unnecessary to state that in true cancer, or big head, the flesh is unfit for human food.

SECTION III.—ANTHRAX OR CARBUNCULAR FEVER.

This disease, known as charbon by the French, and by the many common English names of murrain, black leg, quarter ail, inflammatory fever, black quarter, and many others, is common to sheep as well as cattle. Upon the first observance of the symptoms, given further on from Clater, the animals affected should be removed to high, dry, fresh past-

ures, and all young cattle, as being particularly liable to attack, should be put on clean pasture. The fullest fleshed animals are most likely to be attacked. We give the symptoms and remedies in detail as stated by Clater, for the reason that the disease assumes various forms. Hence similarity in symptoms demand looking after with suspicion.

SYMPTOMS.

All the forms of anthrax are remarkable for the paucity of premonitory signs, except as far as the condition of plethora is concerned. Usually the first intimation is the discovery of one or more dead carcasses in early morning. When opportunities for observation occur, the signs are as follows: Costiveness, frequently attended with bloody stools (*proctorrhoea*), deficient and highly colored urine, slight excitement, protruding eyes, and injected visible membranes; hot mouth, slight frequency and fullness of the pulse, and accelerated respiration. These constitute the first stage, and are seldom noticed.

SECOND STAGE.

Lameness or stiffness is now added to the previous signs. Respiration and circulation are notably dis-



Black Leg or Murrain.

turbed, the pulse being full and rapid. The head and neck are protruded, eyes bloodshot, appetite lost, intense thirst, urine darker in color, and the creature stands gloomily away from all its companions. Lameness increases every hour; other signs also rapidly suffer aggravation, and the animal utters low moans, particularly when disturbed. Diffused emphysematous swellings (containing air) appear upon the sides, quarters, or extremities, which crepitate, or crackle like tissue paper, when the hands are passed over them.

THIRD STAGE.

The power of standing is lost, breathing difficult, pulse small, feeble or imperceptible; swellings have increased, and the sufferer lies upon one side with outstretched neck, stomach painfully distended with gas (*hoven*), tongue protruded, eyeballs retracted and

covered by the haw (*membrana nictitans*). The ears, horns, and extremities are cold, and insensibility (*coma*) and death speedily follow, the whole train of symptoms frequently terminating within twelve hours.

In protracted cases the animal continues for several days, when opportunity is thus given for the swollen parts to slough extensively, and smaller spots to appear on the tongue, buccal and other membranes which at first form apparent blisters, and afterward slough, exhibiting very tardy healing powers.

As soon as the animals are discovered ailing, two or three quarts of blood may be taken from the neck vein. Prepare the following:

Crude Antimony in powder,	½ oz.
Brown Sugar Candy, and Nitro in powder,	
of each,	1 oz.
Myrrh, in powder,	½ oz.
Flowers of Sulphur,	2 oz.

Mix for one dose. This must be given fasting in the morning, in a quart of warm gruel; two hours after the animals may be turned into the pasture.

Setons in the dewlap are of great service while they cause a discharge of pus. Young, thriving stock should receive occasional laxatives, or nitre in half or one ounce doses each week while the disease is rife. One of the great causes is undrained land, which is evident in the disappearance of the disease when improvement is made in that direction. Young stock should receive additions of oil-cake to their food at much earlier periods of their youth than is usually practiced in many districts, and sudden change from poor food or pasture to rich aliment of any kind is to be severely condemned.

When the mouth is sore or blisters form, the latter may be opened by a lancet, and the parts should be dressed, washing them two or three times a day with the following mixture:

Alum in fine powder,	2 oz.
Sulphuric Acid,	2 drachms.
Tincture of Myrrh,	2 oz.
Water,	1 qt.

Mix the powder and water together, and add the acid when dissolved; then put in the tincture, when it is ready for use.

Abscesses require opening as soon as pointing appears, and the resulting wound, together with all ulcers, must be kept scrupulously clean. Use the following dressing:

Take of pure Carbolic Acid, 2 drachms.
Pure Glycerine, 1 oz.

Mix and dissolve, then add

Carbonate of Soda, $\frac{1}{2}$ oz.
Water, 10 fluid oz.

The mixture is then ready for use.

SECTION IV.—GLOSS ANTHRAX OR BLAIN.

This is another blood disease of the nature of anthrax. The first indication of serious trouble is the copious dropping of limpid saliva from the mouth, succeeded by a purulent and bloody foam, from the formation and breaking of pustules upon the upper and wider part of the tongue and sides of the mouth. These are ulcerous and difficult to heal. There is



Early Stage of Blain.

rapid congestion and swelling of the nose, face, neck and contiguous parts, involving difficulty of breathing and the animal often dies within twenty-four hours. Diseased animals should be separated from others, and the same general rule followed as in anthrax. In the earliest stages bleed and give the following:

Epsom salts,	1 pound.
Ginger,	2 ounces.
Gentian,	2 ounces.

Mix with a quart of highly sweetened warm ale, or with the same quantity of warm gruel and give at once.

Since the animal cannot eat the strength must be kept up by liquid food, as gruel of linseed, oatmeal, etc. Hay tea, with a little nitre dissolved therein, should be given for drink.

The pustules in the mouth should be opened. The mouth should be washed three times a day at

least with some cleansing wash. The following is good:

Powdered Alum,	2 ounces.
Oil of Vitriol,	2 drachms.
Honey,	4 ounces.

Mix these three together in a glazed earthen vessel and then add the water.

To wash the mouth raise the head well up, pour in a teacupful of the preparation and release the head. The working of the jaws will carry the wash over the mouth. Very bad ulcers may be touched with a weak solution of carbolic acid in addition. As the animal recovers feed well and keep secluded until fully well.

SECTION V.—PLEURO-PNEUMONIA, OR LUNG FEVER.

The contagious form of malignant pleuro-pneumonia has already been treated of. No remedial means avail, and it is sometimes difficult for the veterinary surgeon to distinguish between simple and contagious lung disease, unless he knows something of the previous history of the cattle.

As an assistance in determining between the simple (sporadic) and the contagious form of pleuro-pneumonia, we have placed the traits of the two affections side by side, showing the dissimilarities between the two diseases, to contrast their points of identification:

SPORADIC	PLEURO-PNEU-	EPIZOIC	PLEURO-PNEU-
	MONIA.		MONIA.

Common to man and all animals.

Sudden and acute in its attack and progress.

Has no incubative or latent stage.

First signs visible in a few hours from the operation of known causes.

Greatly influenced and even induced by climate, temperature, exposure, ill ventilation, bad drainage, bad management, etc.

Removal of these is attended with a reduction of disease and mortality.

Affects the same animal more than once in a lifetime.

Hitherto confined to bovine animals—cattle.

Insidious in its attacks and tardy in progress.

Has an incubative stage of forty-two days generally, sometimes much longer.

First signs not visible until the termination of the period of incubation, viz., forty-two days generally.

None of these produce epizootic pleuro-pneumonia; by debilitating the system they may cause its progress to be modified, but in no case to hasten its attack.

The same effects no reduction of either disease or mortality.

Never affects the same animal twice in a lifetime.

following is

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drachms.
ounces.

earthen vessel

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and release the
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ENG FEVER.

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No remedial
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Seldom more than one, two or three out of a number are affected; the rest suffer from other catarrhal affections.

The attacks are simultaneous.

Is generally suppressed by mitigation of causes.

Is markedly amenable to medical treatment.

Not usually fatal.

Prevails in localities according to season, and is found in districts where cattle are bred and no other allowed to enter.

Not propagated by contagion.

Not produced by the diseased products of the body, as saliva, excrement, urine, etc.; nor conveyed to other animals occupying the place of those dying or diseased.

Is unaffected by movement to and from fairs and markets, as far as propagation is concerned.

Not confined to large herds or dairies of cattle.

Terminates in about a week or ten days.

Animal regains its former health in most cases.

Portions of the lungs are usually capable of resolution.

Hydrothorax not common.

Death in four to eight days.

Frequently more than two or three are seized—generally the whole at variable periods.

The attacks are in succession.

No effect occurs here from the adoption of the same, but continues to prevail for weeks and even months.

Is affected by no kind of treatment.

Generally fatal, even to the extent of fifty per cent and upwards.

Confined to none where cattle are conveyed, and prevails without respect to season; where cattle are bred and none are taken it is never witnessed.

Is propagated by contagion.

Cattle occupying the stalls or stables where animals diseased or dying have been standing become affected with the disease. The conveyance of fodder, portions of excrement, or diseased products usually generate the disease in others, and an animal allowed to smell at one diseased becomes affected.

Is greatly augmented by cattle traffic.

Always prevails most in the dairies of towns and of those proprietors who use the markets.

Progress lingering, frequently extending over some weeks.

After recovery the animal is frequently worthless.

One or both lungs are generally destroyed or unable to take on the process of resolution.

Hydrothorax very common.

Death frequently delayed to the fifteenth day.

The symptoms common to simple or sporadic pleuro-pneumonia are as follows: A shivering fit may be observed, and shortly afterward the secretion of milk is arrested. Acute symptoms now quickly succeed, consisting of rapid pulse, which is firmer, harder, and not so full as the pulse of simple pneumonia. We therefore observe at first a loud murmur through the lungs, quickly succeeded by a crackling sound, which rapidly disappears as the lungs are invaded. The friction sound of pleurisy also is heard, and percussion gives a dull tone in the affected parts; pressure in the intercostal spaces, or on the spine, gives pain. The bowels are constipated, urine deficient and highly colored; catarrhal signs, as discharge from the nose and eyes, are present; membranes injected; legs, horns and ears cold; coat stares, and skin becomes harsh and dry.



Position in Pleuro-Pneumonia.

The animal in many cases never entirely loses the appetite, nor is rumination suspended, and the signs enumerated gradually disappear, the pulse acquires fullness and becomes softer, breathing is regular, secretions natural, general warmth is established, and the animal becomes convalescent before the extensive wasting occurs that characterizes epizootic pleuro-pneumonia. Throughout there is not observed that soreness of the windpipe and dilatation, and flapping of the nostrils, as in the contagious form; and, lastly, these signs are usually absent about the tenth day.

The appearance of the animal in pleuro-pneumonia, and it applies to the contagious form as well, is shown in the cut.

SECTION VI—SPECIFIC SYMPTOMS OF THE CONTAGIOUS FORM.

We have, in chapter X, given the specific characteristics of contagious pleuro-pneumonia, a better name for which would be, deadly lung plague.

We have in the article Pleuro-pneumonia (generally called lung fever), given a comparison of the specific differences in the two diseases, followed by detailed

symptoms. For the reason that there is fear that, for many years, deadly lung plague will decimate the herds of the United States, we give the specific symptoms as detailed to us by Dr. Hughes, of Chicago, a gentleman who has had large experience in this and other contagious diseases under the British government, as stated by his observation of a late case at Elmhurst, Ill., and from a post-mortem. These are:

"It is a contagious febrile disease producing characteristic changes in the lung tissue and pleura. The incubatory period commences when the poison enters the lungs. The disease may attack a single lung, or both, or only a single portion of the lung. Symptoms were: dry cough, increased temperature, hair erect, refusal of food, labored breathing, structural changes in lungs, pulse quick and weak, nostrils dilated, fore-legs wide apart, head low, grunt emitted, soreness of chest wall on pressure, and, on auscultation (listening), sounds are heard with which the practitioner should be familiar in order to make a diagnosis. All symptoms more aggravated as disease approaches a fatal termination. Death ensues from blood poisoning, from suffocation, or failure of heart's action, due to non-aeration of blood. Some animals recover after presenting acute symptoms for one or two weeks; others are so slightly affected that only the closest observation can detect any indisposition, while others resist all attempts at infection.

"Post-mortem shows lesions almost entirely confined to thoracic organs. Diseased lung adheres to chest wall or diaphragm. On cutting lung, various stages of disease manifested; some portions congested, some in stage of red hepatization and some in stage of grey hepatization, showing the disease to be a slow, progressive one. Pulmonary pleura, adherent to costal pleura over all patches of inflammation; abrupt line between diseased and healthy lobules; wide, marbled bands between lobules due to thickening of interlobular connective tissue; non-adherent pleura over diseased part, rough, thickened and covered with dirty, yellowish colored lymph; quantity of effusion in chest cavity; sometimes great, sometimes little. Animals that get mild attacks and apparently recover carry about with them a consolidated portion of lung. In a few weeks a well marked line of demarcation is visible between the diseased and healthy portion, the hepatized part acting as a foreign body, owing to the vascular and nervous sup-

ply being cut off. A well-marked capsule or cyst forms around it, and it gradually shrinks, becoming smaller and harder with age. Frequently lime salts are deposited in the mass.

"Recovered, or apparently recovered, animals remain a source of infection for an indefinite period. When all the inflammation has subsided, and the diseased portion thoroughly encysted, they may be considered safe, but when this occurs it is not easy to say. The fact of the disappearance of the cough and febrile symptoms, and the resumption of all the normal functions and secretions is no evidence that the animal is incapable of communicating the infection. When the disease breaks out on a farm where it has not before visited, it is hard to make a diagnosis. Learn the history of the affected animals, and slaughter one before giving a decided opinion. Isolate suspicious animals. When exposure has taken place no medicines will prevent it manifesting itself. The administration of preventive medicines may modify the effect, but a highly nourished condition of the system will do more to resist its inroads and make it assume the benign form.

"Attend to general hygienic conditions. Pursue a course of thorough disinfection, and isolate all suspected animals. When fully developed, especially if both lungs are involved, the animal dies. An animal will live and thrive with one lung consolidated, but such an animal is by no means desirable."

We may add that, as a rule, the attack being considered sudden, and if the disease yields kindly to treatment, or if the animal gets worse and soon dies the presumption is that it is common lung fever. Any animal, however, dying, ought to be examined by the state veterinarian, if there be one in a state appointed to that office.

SECTION VII.—TREATMENT OF NON-CONTAGIOUS PLEURO-PNEUMONIA.

In the treatment of this disease, the most the stock breeder can do is to watch symptoms and palliate them. The advice of a professional veterinarian should be sought when possible.

The bowels should be kept regular by injections, but if diarrhoea is present it may be checked, if severe, by

Alum, powdered,	$\frac{1}{2}$ oz.
Milk,	1 quart.

Mix for a dose.

If the diarrhea is slight, however, do not interfere with it.

For the pleuritic symptoms, if the chest fills with water, apply mustard plasters back of the fore-legs and on each side. Every six hours give the following:

Camphor, finely powdered. 2 drachms.
Nitric Ether, 1 to 2 oz.

Dissolve the camphor in the ether and add a pint of gruel; then add the saltpetre finely powdered. Shake until dissolved and give immediately.

For the inflammatory symptoms, or pneumonia, if constipation is present give a laxative as follows:

Epsom Salts, 8 to 12 oz.
Ginger, powdered, 1 oz.
Gentian, powdered, 1 oz.

Mix in a quart of gruel.

Do not forget injections as previously stated in connection with the medicines if the bowels are constive.

Blistering will be indicated as soon as the acute symptoms are passed, as indicated for the pleuritic symptoms, and if violent, a strong blister may be used.

Croton Oil, 1 part.
Sulphuric Ether, 10 parts.
Alcohol, 10 parts.

Shake all thoroughly together, and rub strongly on each side of the chest, and also upon the breast. The effect will be soon observed, and when the swelling is considered enough, wash off.

For bronchial symptoms, cough, high, full pulse, the following will be indicated:

Solution of Acetate of Ammonia, 4 oz.
Tincture of Aconite, 20 drops.
Water, $\frac{1}{4}$ pint.

Mix, and give at once.

At the end of four hours give the same dose, except that only ten drops of aconite are to be used; repeat every four hours, but as soon as the pulse is quieted, cease at once, and give

Solution of Acetate of Ammonia, 4 oz.
Extract of Belladonna, $\frac{1}{2}$ drachm.
Water, $\frac{1}{2}$ pint.

Administer twice a day.

Thus we have included in the remedies, those indicated in pleurisy, bronchitis and pneumonia, since often all the symptoms are present, the bronchial tubes, the pleura and the lungs being all

affected. Simple pneumonia is rare in cattle, and when it is simply inflammation of the lungs, the animal will generally do well with good nursing, warm shelter, soft, nutritious food, and a mustard plaster, perhaps, when the acute symptoms have subsided.

CHAPTER XIV.

DISEASES OF THE DIGESTIVE ORGANS.

SECTION I.—TYMPANITIS, HOVEN OR BLOWN.

On page 246, we have given an engraving of the several stomachs of the ox with explanations and comparison with that of the calf. The disease known as hoove, hoven, bloat, blown, etc. (*tympanitis*) explains itself. It is distention of the stomach by eating too much green food or other fermentable food, causing distention of the parts and often rupture. Never allowing cattle to remain long in a lush pasture when hungry, and care in feeding is the preventive. If tympanitis does occur, at the first intimation give something to stimulate nerve action, restore secretion and the action of the stomach: Take,

Liquor Ammonia, $\frac{1}{2}$ oz.
Essence of Ginger, $\frac{1}{2}$ oz.
Cold Water, 1 quart.

Mix, and give without delay.

It is necessary in all cases of impaction of the rumen that the bowels be freely moved upon the subsidence of the most dangerous symptoms. Give,

Epsom Salts, $\frac{1}{2}$ pound.
Croton Oil, 20 drops
Linseed Oil, 1 part.

Mix.

Injections of warm water, temperature 96 to 100 degrees, will assist in relieving the bowels.

In every case of severe impaction no time must be lost. If the animal be not discovered until the difficulty has considerably progressed, there will be great swelling of the abdomen, moaning, and prominence and wildness of the eye. The gas may often

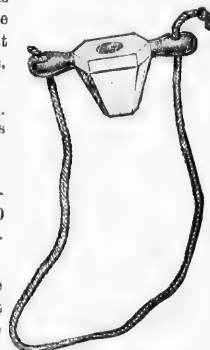


FIG. 1.—Wooden Gag, Applied when Using Probang.

be relieved by passing the probang through the mouth and into the stomach. The tube of a stomach pump would of course be better. Any firm gutta-percha tube will do.

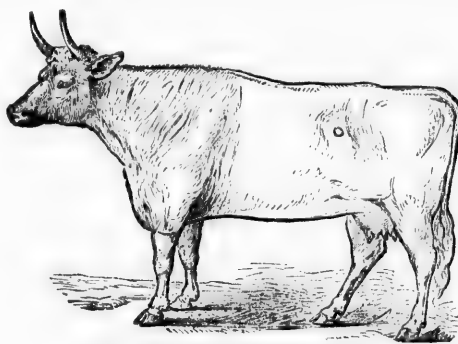
The annexed cuts show, Fig. 1, a gag for preventing the animal from obstructing the tube with the teeth, and Fig. 2, the gag in position.



FIG. 2.—The Gag Fixed.

In case the disease has progressed so far that remedies do not give relief, or there is no time to use them, the paunch must be punctured. A trochar and canula is the proper instrument, but even if one of these is owned, it is perhaps not at hand. Then

the animal by the nose, and with the right side against a wall of the barn or shed, plunge a sharp knife (see cut) into the paunch (rumen) starting midway between the last rib and the haunch bone, and five or six inches from the loin bones, as the case may be. Without withdrawing the knife, continue the cut downward, forming an opening large enough to admit the hand. (Make the cut large enough.) Then, by means of a stitch, fasten the inner part of the stomach to the lower part of the cut. Take out the contents of the stomach fully; cleanse the edges of the wound with warm water; sew up the coats of the stomach with strong white silk, uniting the edges nicely—that is, turn the lips together. Sew up the outer edges of the wound, and put on a strong pitch plaster over all. Food only of a sloppy nature should be given for the first few



Place for Puncturing the Paunch for Hoven.

use the knife without hesitation, and if the escape of gas carry with it the contents of the stomach to obstruct, keep the passage clear with a smooth stick or wire. In puncturing, care must be taken not to injure the kidney. The place for puncture is midway between the last rib and the haunch bone about a hand's breadth below the lumbar processes (bones of the loin). The annexed cut is given to illustrate the proper place as marked.

SECTION II.—IMPACTION OF THE RUMEN.

Sometimes the impaction is so great that the contents of the rumen must be removed by hand. This should be done by a veterinary surgeon, but in a case of life or death, the stock owner may operate. Fasten

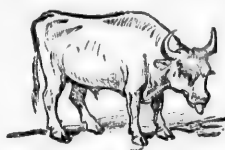
days—thick gruel, pulped roots, strong hay tea, etc.—and only in small quantities. After this the quantity may be increased gradually until, the healing being perfect, the animal may again have solid food.

SECTION III.—IMPACTION OF THE THIRD STOMACH.

Sometimes the third stomach (omasum or manyplies) becomes impacted—especially animals coming suddenly to full feed after being kept low, as is often the case in winter, often from moldy hay or other bad food. The symptoms may be developed gradually. The appetite may be impaired; the animal is dull; the head and ears heavy; rumination, as well as lactation in cows, are suspended; respiration

the right side
plunge a sharp
starting mid-
lunch bone, and
bones, as the
the knife, con-
opening large
the cut large
itch, fasten the
lower part of the
stomach fully;
th warm water;
th strong white
is, turn the lips
all. Food only
for the first few

is interfered with by pressure on the diaphragm; the tongue protrudes; eyes staring and bloodshot; the animal grunts and moans and grinds the teeth in proportion to the distress imposed; abdominal pains arise, and the nose is repeatedly carried to the right flank, while the hind legs are moved or twitched up frequently, and the tail lashed from side to side;



Impaction of the Stomach.

the rumen is often much swollen, which adds to the distress; vision is impaired; the eyes are anaurotic, and will bear the touch of the finger without evincing pain or closing the lids; imperfect movement is evident; the animal staggers, and, if tied, falls forward and rolls on the side, where it lies with limbs rigid and convulsed throughout the attack, until death ensues. If in pasture, it runs about wild and furious.

When vertigo and delirium are delayed, obstinate constipation will be apparent. The feces are discharged at first with some straining, and in small and frequent quantities. They are also more or less fluid. Injections fail to move anything away, the straining grows more severe, and blood passes with mucous at each attempt; the urine is highly colored, deficient and hot; the small intestines are irritable, and colic increases. The pulse, at first tolerably full and of natural frequency, becomes rapid during the spasms; and, as the brain is influenced, it is slow and oppressed, eventually small, feeble, indistinct, and at last imperceptible. Apart from affections of the nervous system, it becomes frequent, hard, wiry, small, feeble, and with dissolution indistinct and at last imperceptible. The disease may have a duration of only two hours, or it may extend to several days. Favorable states are indicated by a delay of brain affections, the pulse retaining a degree of strength and volume, solid flakes of ingesta being discharged with other fecal matter by the rectum, relief from pain, etc.

A declining pulse, continuance of constipation, vertigo, and pain, are signs which are highly unfavorable.

Treatment should be prompt and persistent. A full cathartic must be given at once:

Epsom Salts,	1 pound.
Powdered Aloes,	4 drachmas.
Powdered Ginger,	2 drachmas.
Hot Water,	1 quart.

Mix with warm linseed tea, say two quarts, and give at once, when cool enough to be taken. Give, every half hour, copious injections of warm water, say two quarts every half hour, until the medicine acts.

TO GIVE INJECTIONS.

In lieu of a proper pump, attach a gutta percha tube section of small hose to any vessel having a faucet, and holding a gallon. This must be raised about three feet above animal. Introduce the tube well into the rectum not less than six inches; turn the faucet, and the liquid will be forced into the bowels. The second day, if the medicines have not acted fully enough, give:

Carbonate of Ammonia,	$\frac{1}{2}$ drachm.
Linseed Tea,	1 quart.

Mix, and give by the mouth two or three times a day. When the appetite returns, give nourishing succulent diet until the appetite fully returns.

In lighter cases the following will be found good:

Tincture of Aconite Root,	20 drops.
Lime Water,	4 ounces.
Sweet Oil, or Cotton Seed Oil,	4 ounces.

Mix in a quart of warm milk, and give three times a day.

SECTION IV.—ERGOTISM.

This is produced by eating the smut of grain or smutty hay, but generally by cattle running in stalk-fields infected with smutty ears of Indian corn. The treatment may be like that for impaction, since relieving the stomach and bowels is the prime necessity. Stock seldom suffer from ergotism, if plenty of water is always near where they may drink. Fields known to be infected with smutty corn should never be fed off.

SECTION V.—RED WATER OR HEMATURIA.

This is usually considered a blood disease, arising from imperfect digestion and assimilation, causing degeneration of the plastic materials and corpuscles of the blood, discharged through the kidneys in an altered condition. It is peculiar to both cattle and sheep and the treatment is identical, except in the administering of medicines the sheep should not receive more than one-tenth to one-twelfth the dose

ing hay ten, etc.
After this the
until, the heal-
gain have solid

RD STOMACH.

usum or many-
animals com-
kept low, as is
moldy hay or
y be developed
aired; the ani-
rumination, as
ed; respiration

for an ox, according to size. It has a number of names, as red water, black water, bloody water, etc., and is analogous to Bright's disease in the human species. The disease is characterized by the passage



Appearance of Cow with Red Water.

of a bloody, chocolate-colored, or of very dark, even black urine, containing albumen, and without inflammation of the kidneys. The symptoms are great prostration, palpitation of the heart, rapid, trembling pulse, with diarrhoea, followed by most obstinate constipation. There will also be loss of milk, in cows, and unusual frothing in the pail, and upon standing a red sediment will be deposited.

TREATMENT.

Give the animal good quarters and abundance of nourishing food. Do not check the diarrhoea, but avoid strong purgatives.

Give every two or three days, until three or four doses have been administered:

Castor Oil,	2 oz.
Linseed Oil,	1 pt.

Mix, and give at one dose, and if constipation follows relieve it with the same remedy and injections.

Give also twice a day:

Chlorate of Potash,	$\frac{1}{2}$ oz.
Tincture of Chloride of Iron,	$\frac{1}{2}$ oz.

Mix in a pint of thin gruel and give the dose twice a day. As soon as the urine is changed give the following tonic morning and evening:

Solution of Perchloride of Iron,	$\frac{1}{2}$ dr.
Infusion of Quassia,	$\frac{1}{2}$ pt.
Essence of Ginger,	$\frac{1}{2}$ oz.

Attend scrupulously to cleanliness and ventilation of the stable. Keep the skin healthy with careful grooming, and allow for drink largely of linseed tea.

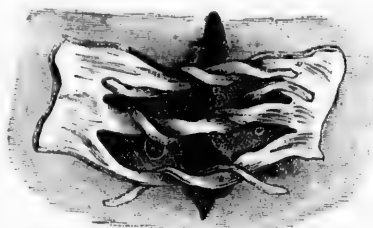
CHAPTER XV.

INJURIES, SPRAINS AND DISLOCATIONS.

SECTION I.—INJURIES FROM WOUNDS.

The same general directions given in relation to wounds, of various kinds, in the treatment of horses,

will suffice for cattle. The cut shows the application of the many-tailed bandage ready for drawing together and tying in the case of open wounds. For foul in the feet see page 256. Aptha—ordinary cases may be cured with a strong solution of copperas.



Many Tailed Bandage for Use in Open Wounds.

As a rule, fractures of the bones will not pay for treatment, unless in the case of very valuable breeding animals, and then a veterinarian must be employed.

SECTION II.—SPRAINS.

In case of bruises, sprains, etc., the inflammation must be first reduced with embrocations of warm water applied constantly for three or four hours, or either of the linaments given below may be used, especially in the case of sprains of the tendons:

Alcohol,	2 oz.
Water,	1 pt.

Mix.

Alcohol,	2 oz.
Acetate of Ammonia,	4 "
Water,	1 qt.

Mix.

Sal Ammoniac,	2 oz.
Dilute Acetic Acid,	16 "
Alcohol,	2 "

Mix.

In such cases a linen bandage is to be applied to the part and kept constantly wet with the mixtures, or they may be applied with moderate friction.

The use of these lotions should be persistent, or no good will result, and in case any difficulty attends this mode of treatment, hot fomentations may be substituted, if, as heretofore stated, applied with diligence.

As soon as the high vascular action is reduced

and coolness is noticeable in the parts, a stimulant may be applied, as the following:

Soap Liniment,	8 oz.
Solution of Ammonia,	1 "
Tincture of Opium,	3 "

Mix.

To be applied once or twice a day with smart friction.

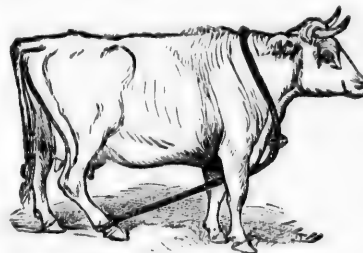
SECTION III.—DISLOCATIONS.

Dislocation of the joints must be reduced. In case there is no veterinarian within reach, apply to your family physician for assistance. The most usual difficulty is the dislocation of the patella, the joint above the hock, called stifled, in the horse. The evidence of this is apparent. The limb is thrown back and useless from the dislocation, and a depression is seen at the front of the joint. The animal goes on three legs, while the affected limb is dragged afterward, the foot and even the fetlock touching the ground. Pain and heat, with some amount of swelling, is present at first, but as time passes these disappear, the ligaments elongate, and the outer lip of the trochlea is worn by the false position of the patella. When this has fully taken place dislocation is constant, and accompanied by a sharp cracking sound in progression, caused by the bone under pressure of the muscles and ligaments repeatedly flying back into its proper position, but from the deformity alluded to unable to remain.

Recent cases only are reducible and recoverable. Animals thus affected require prompt measures, great care, level floors, and perfect rest.

TREATMENT.

Pass the loop end of a halter round the fetlock of the affected limb, and direct assistants to draw it forcibly upward and forward toward the abdomen, the rope being passed between the fore extremities.



To Prevent Dislocation of the Patella

Grasp firmly the muscular part of the leg with one hand—pulling outward—and with the other placed securely upon the patella, push inward. Reduction is seldom difficult. A collar should now be improvised, either an old horse-collar cut open at the top so as to admit of being put on, and afterward tied with rope round the place where the hames rest, or one of flat webbing, rope, etc.; and to this secure the rope from the foot, which should be so short as to cause the affected limb to be considerably in advance of the sound one, and this hopple should be worn until the animal is again sound.



GROUP OF AMERICAN MERINO SHEEP.

Sheep and Sheep Husbandry.

CHAPTER I.

SOME HISTORY OF BREEDS.

SECTION I.—ORIGINAL COUNTRY OF SHEEP.

The native country from whence was derived our native sheep is lost in obscurity. It is, however, probable that they were the first animal domesticated, when man emerged from the savage state; the dog, probably, having been his helper, as a savage, as we see universally in all purely savage tribes. There are, however, wild races of sheep in both the old and new world. The true sheep in its domesticated state, however, have so little in common either with the Mouflon, the supposed original of our domesticated sheep, (*Ovis Musmon*), of Africa and Southern Europe, or the Argale, (*Ovis Ammon*), of Siberia, or the Big Horn or Rocky Mountain sheep, (*Ovis Montana*), that they are interesting to the naturalist alone.

SECTION II.—BREAKING UP INTO BREEDS.

The breaking up of sheep into distinct breeds, and which preserve their characteristics perfectly, is of quite modern date, though Spain has had a breed celebrated for their fine wool, since before the Christian era. Yet, even these sheep remained comparatively unknown over the world until the breaking up of these celebrated flocks in the beginning of the present century.

England sent wool to southern Europe, especially to the Florentines, as early as the fifteenth century. Every country of Europe has long since had its special breeds, but they have not been, until within the last hundred years, except in England and Spain, bred with special reference to purity of blood and distinctiveness of wool and flesh. America profited most largely by the breaking up of the Royal Spanish flocks, and from this resulted what is now known distinctively as the American Merino, which confess-

edly combine extraordinary fineness of wool with length of staple.

SECTION III.—VALUE OF THE SHEEP INDUSTRY.

In 1870 a German estimate placed the annual wool product of the world approximately as follows:

"Recent German estimates (approximate) give to Great Britain an annual production of 260,000,000 pounds of wool; Germany, 200,000,000; France, 123,000,000; Spain, Italy and Portugal, 119,000,000; European Russia, 125,000,000; making a total estimate for Europe of 827,000,000 pounds; in Austria, South America, and South Africa, 157,000,000; the United States, 95,000,000 (too low); the British North American provinces, 12,000,000; Asia, at a very general estimate, 470,000,000; northern Africa, 49,000,000; the aggregate annual production of the world being put at 1,610,000,000.

In 1880 the number of sheep of the world was estimated in round numbers at 600,000,000 and the fleeces at 2,000,000,000 pounds of wool. The average of wool to the sheep in the United States, is higher than that of any other country on the globe, averaging over five pounds per head of clipped wool. England is credited with an average of four and three-quarter pounds of wool per fleece, with 52,000,000 pounds for wool of sheep butchered during the year. The number thus disposed of is usually reckoned at three-eighths of the standing numbers of the flocks. In the German Empire the average is placed at three and two-thirds pounds, with 6,000,000 fleeces of three pounds from slaughtered sheep. Hungarian fleeces are lighter, and in Austria-Hungary the extra fleeces are assumed to bring the average nearly to three pounds for each sheep. France produces heavier sheep and fleeces than the German states, more mutton-sheep, with a larger proportion annually slaughtered, mak-

ing 124,000,000 pounds for standing flocks of 26,000,000 sheep a reasonable estimate. The South American fleeces are variable, but the average is much lower than in south Africa or Australia, and the sheep of Asia cannot be safely estimated to yield more than two pounds each.

The last census (1884) gives the number of sheep in the United States at 35,192,074 head, and the number of pounds of wool at 165,681,751. The aggregate value of these sheep may be stated at about \$80,000,000. The value of the wool crops, at 25 cents per pound, would be nearly \$89,000,000. If to this is added the value of the lambs and mutton consumed, the wool and mutton will probably aggregate an amount annually not less than the total estimated value of the breeding sheep of the country. It will therefore be seen that the sheep industry of the country is really a very important one, the annual money value resulting from them standing next to that of swine.

SECTION IV.—IMPROVEMENT OF SHEEP.

The improvement of sheep consists in carefully adapting the breed or breeds to the special requirements of a country or district. In another portion of this work we give the general principles relating not only to science and art in breeding, but we also present sheep as showing results in improvement, since it may be more quickly seen than in either cattle or horses.

The heavier mutton sheep as a rule are adapted to lower lying lands than the smaller mutton breeds; the fine woolled sheep are especially adapted to high, rolling lands and dry plains. The improvement of the flock may soon reach a high grade simply by employing pure males of the breed required. Ewes often produce two at a birth. The best should always be selected in breeding up a flock. Ewes breed at one year old. Hence the shepherd in a very few years of careful breeding, produces animals in every respect as good, practically, as pure blooded sheep, except in this: The wool will not be so even in its texture, nor will they be so valuable for breeding as a pure bred; but, they will be strong constitutioned, comparatively even in quality of flesh and wool, and the breeder will have acquired his flock at comparatively little cost.

SECTION V.—RANGE OF CLIMATE OF SHEEP.

The range of climate for sheep extends from those intertropical, north and south, throughout the en-

tire temperate zone. In the tropics, however, sheep thrive only at high altitude. The best flocks and fleeces are found upon upland pastures of the temperate zone. The evenness of fleece in sheep depends upon the condition in which the animals are kept during the season of principal growth of wool, which is from September until shearing time. If sheep are allowed to get thin in winter, the fleeces will be weak in quality. If subjected to storms of rain, snow, sleet and freezing winds, by which they lose flesh at such times, and then again take on flesh in mild weather, each one of these periods will be marked by weak places in the wool. In fact, the profits of sheep husbandry depend almost entirely upon the care given to keep the flock from being worried by dogs, to keep them in good growing condition, in keeping them from disease incident to all stock kept running in large numbers together. Hence, unless the flock-master can give careful attention, especially in the winter and in lambing time, he had better devote his attention to other stock.

CHAPTER II.

FINE WOOLED SHEEP.

SECTION I.—MERINO SHEEP.

Some observations on the introduction of Spanish Merino sheep into the United States, and the means used in adapting them to the requirements of the country, is contained in the latter portion of this work, "Principles in Stock Breeding," Chapter II. Our fine woolled sheep are now styled, distinctively, American Merinos. There are many varieties of Merinos in various parts of the world. The English Merino is a mixed breed, and inferior. The Saxony and Silesian have exceedingly fine wool, but are not at all adapted to our climate. Where the French Merino, a modified Spanish, have been crossed on our Merinos, it has always degraded the quality of the wool. The Merinos of Australia are also a composite breed of English, Saxony and Spanish origin. The wool is fine, close, and inferior only to the American Merino in weight of fleece; but it is not equal in any respect except in fineness. Of late years, American rams have been exported to Australia via San Francisco, and with great benefit to the flocks.

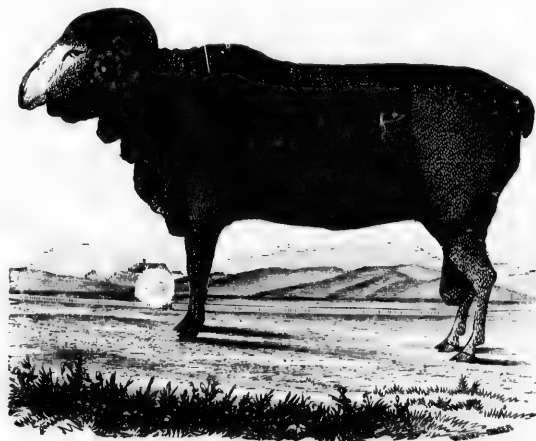
FINE-WOOLED SHEEP OF EUROPE.

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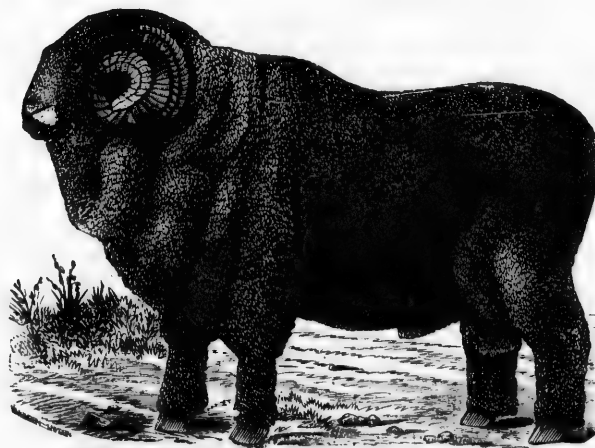
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ELECTARAL ESCURIAL SAXONY RAM, MODIFIED SPANISH.



RAMBOUILLET-NEGRETTI RAM, (French) OR MODIFIED SPANISH.

Spanish sheep have proved valuable among the fine-wooled sheep introduced into the United States, we give a short compiled account of some European breeds, all of them easily traced to the Spanish as the foundation stock.

SPANISH SHEEP.

The fine-wooled sheep of Spain have been famous for centuries. Those of Castile and Leon, the "Transhumantes," or traveling flocks, bear the largest and finest fleeces. Those of Soria have very fine wool upon an inferior carcass, while those of Valencia have a fine wool of short staple; in both of these districts the flocks are stationary. Jorvellanes, a Spanish writer, estimating the migratory sheep at 5,000,000, has deplored the injury to husbandry by the monopoly (under royal protection) of all the best pastures in the kingdom, the enjoyment of special privileges in traveling to and from these summer mountain pastures, and the consequent banishment of stationary flocks and the depopulation of the country; and all for the advantage of a few aristocratic proprietors. This superior breed of traveled sheep is divided into several families; the Escorial, with wool of excellent fineness; the Guadalupe, noted for symmetry of form, fine quality and good quantity of wool, with an awkward enlargement of the throat and a hairy appearance in the lumbs; the Negretti, the largest and strongest of the migratory sheep; the Infantados, Aqueirres, Paulars, Montarcos, and others.

The Merinos vary greatly, not only in Spain, as might be expected with so many different families, but in the different countries into which they have been introduced. Still they retain, in a remarkable degree, the prominent peculiarities of the breed—fineness of wool, comparatively small size, short legs, a fine eye, a bold step, hardness, and longevity. Compared with recent improvements in mutton-breeds, the legs, it is true, might seem long, but they are shorter than the unimproved sheep.

The cut shows the Spanish Negretti, as modified in France.

FRENCH MERINOS.

Coming now to the French Merinos, a family established from the Spanish, under imperial protection and with peculiar management, were larger than their progenitors, with good but not the best wool, a loose skin disposed in pendulous folds, and

a very heavy fleece, very yolky, with little external gum. In 1796 the average weight of fleece was 6 lbs. 9 oz.; in 1797, 8 lbs.; 1798, 7 lbs.; 1799, 8 lbs.; 1800, 8 lbs.; 1801, 9 lbs. 1 oz. In later years rams have sheared from eighteen to twenty-four pounds. These fleeces would shrink one-half in washing. Mr. Livingston made the shrinkage sixty per cent. High feeding, and a general forcing process in their subsequent development, while it gave larger animals and more wool, resulted in diminished hardness, poorer quality of wool, and unevenness of fleece. French Merinos are unpopular and are very generally discarded, so that traces of their blood yet remaining in the country are rapidly disappearing. On page 279 we present two cuts, showing the improvement in this French breed in the last 100 years.

SAXON MERINOS.

The sheep of Saxony, originally introduced by the elector of Saxony from Spain, are regarded as a distinct breed, yet are properly a branch of the Merino family. They are remarkable for the exceeding fineness of their wool; but their fleeces are so light and thin, and their constitution so fragile from extreme tenderness of treatment, that they are not generally regarded as a reliable or profitable breed for the rough sheep husbandry and rougher climate of this country. Their fleeces average little more than two pounds. See page 277.

They were first introduced into this country by Samuel Henshaw, of Boston, in 1823. In 1824 the Messrs. Searle, of Boston, imported seventy-seven; and in the same year, in connexion with Mr. Henry D. Grove, nearly 200 more. In the following years, up to 1828, numerous importations were made, when their popularity began to decline, and to-day they are nowhere found, except in amateur breeding.

SILESIAN MERINOS.

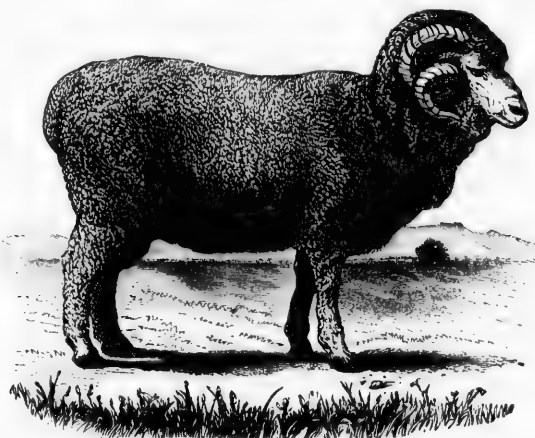
This offshoot from the Spanish stock, originating some fifty years ago from a flock of Infantado ewes and Negretti bucks imported into Silesia, has become a breed of considerable note, bearing wool of an exquisite fineness. Mr. Randall, in his most valuable treatise on fine wool sheep husbandry, deems them peculiarly fitted to the office of improving coarse families of Merinos in evenness and fineness of fleece. They are as large as the American Merinos, the fleece yolky and dark-colored, but destitute of gum. They are moderately hardy, have been bred

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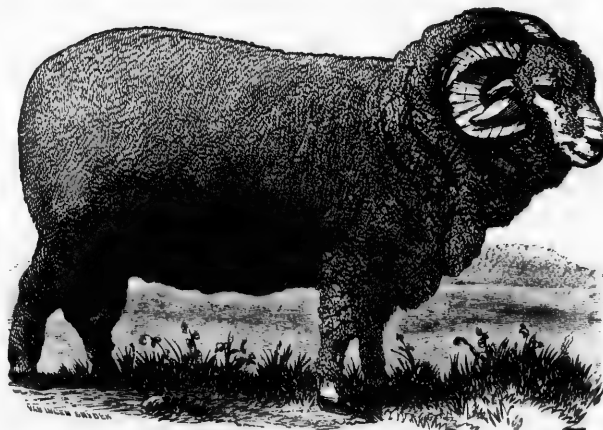
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RAMBOUILLET (French) RAM OF 1787.



RAMBOUILLET (French) RAM OF TO DAY.

with skill and care, not pampered in feeding, but are not valuable in the United States.

SECTION II.—AMERICAN MERINOS.

The American Merinos are, or should be, descended from pure Spanish sheep without admixture. They are divided into families. Those of the Atwood and Hammond strains, from their careful breeding, may be regarded as the best, and are the direct descendants of the Negretti and Infantado importations from Spain in the early part of the century. The descendants of the Infantados are the true American Merinos, as recognized to-day. The Paulars are smaller than the true American Merinos, but fully as hardy in constitution, and by their breeders held in as high estimation as those of the Atwood and Hammond stock.

IMPROVED INFANTADOS.

Dr. Randall describes the improved Infantados as follows: The improved Infantados are a fourth if not a third larger than their Spanish ancestors, and are the largest family of American Merinos. Full-grown ewes, in their prime, weigh about 100 pounds, and some of them 120 and 130 pounds. They are much rounder in the rib, broader, fuller in the quarters, shorter proportionally in the limbs, and stronger in the bone than were the Spanish sheep. They are indeed models of compactness and of beauty when judged by fine-wool standards. Their hardiness in respect to locomotion, or, in other words, their ability to travel, is not probably as great as it was sixty years ago; for, having no necessity to drive his sheep 800 miles a year, as did the Spaniards, the American breeder, in the place of that useless ability to travel, has developed those qualities which increase aptitude to take on flesh and produce wool. The improved American Infantados appear to be quite as hardy in other particulars as their ancestors, are more prolific and better nurses, and when properly fed, resist other vicissitudes equally well, and endure cold even better, but probably demand better keeping. They will thrive, however, where none of the mutton breeds above described would find sufficient subsistence. Choice Infantado flocks with the usual number of sheep of different ages, yield from nine to ten pounds of wool per head. The fleece is longer, thicker, and covers the different parts of the animal far better than it did on the Spanish sheep.

IMPROVED AMERICAN PAULARS.

The improved American Paulars are smaller, consume less food, and perhaps can better endure deprivation of it. Accordingly they are the sheep for cold, meager soils; for the scanty herbage of mountain districts, and for plains subject to periodical droughts. They have about the same general improved points of form as the Infantados, but are shorter-bodied. As breeders and nurses they are equal. Their fleeces are of equal quality, but are a pound or two lighter to the head. For that reason, and on account of the greater size of the former, there is, at the present time, a prevailing inclination to cross the Paular flocks with Infantado rams. This produces an admirable result for the wants of many farmers, but it would be very unfortunate if the present mania for great fleeces should lead to the loss, in its essential family purity, of a class of sheep so well adapted to extensive regions of our country.

SECTION III.—OTHER FINE WOOLED BREEDS.

The other fine woolled breeds are the French Merinos, not adapted to the climate of the United States, being inferior and tender. The Silesians and Saxon sheep produce wool of the very finest quality, but they are tender and delicate. The fact that excessively fine broadcloth has gone out of fashion, probably never to return, has caused the interest in these breeds to entirely die out in the United States. The Merinos of Australia, as heretofore stated, are a composite race of very fine wool, and of excellent herding qualities, also special characteristics of American Merinos. The Australians, however, have not been so carefully bred as our sheep, and hence the increased inquiry of late years for Merinos from our best flocks to breed upon Australian finely bred ewes.

CHAPTER III.

BREEDS VALUABLE FOR MUTTON AND WOOL.

SECTION I.—CHARACTERISTICS OF VARIOUS BREEDS.

The Down sheep may all of them be classed as medium woolled, as distinguished from longer combining woolled and fine woolled sheep. The middle woolled breeds of Great Britain are the white and black-faced Highland, the Cheviots, Dorsets, the Welsh Mountain, and the Mountain sheep of Ireland. Those that have become noted in the United States

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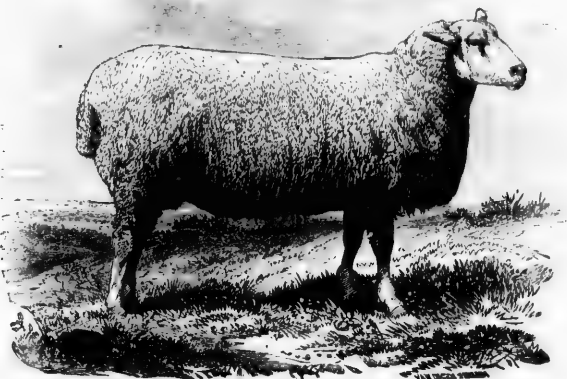
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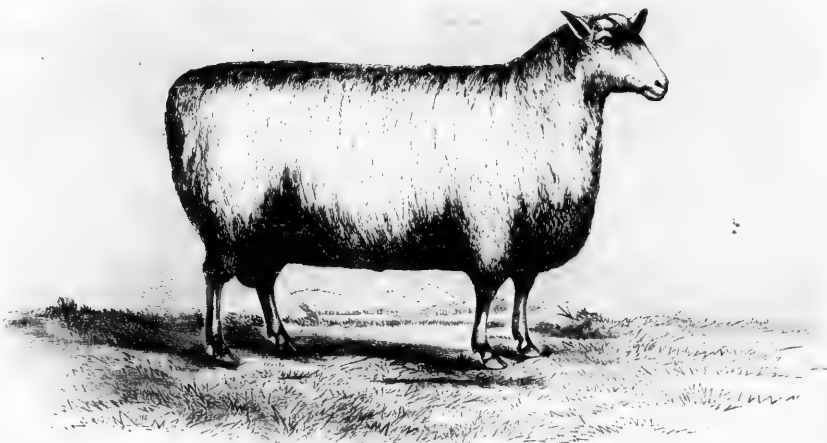
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TEXEL, MOUTON FLANDRIN OR FRIESLAND EWE.



MODIFIED COTSWOLD.

and Canada are the Hampshire, Shropshire, Oxford and the Southdowns.

LONG WOOLED SHEEP.

Of the long woolled breeds of England, also estimated both for wool and mutton, may be mentioned: The Leicester, Cotswold, Romney Marsh, Lincoln, and the new Oxfordshire, which latter, however, has met with little favor in the United States.

TEXEL SHEEP.

A Netherlands sheep, the Texel, Mouton Flandrin or Friesland sheep, has been imported but not found valuable. They are, however, highly thought of in the Netherlands and some portions of France and Germany for medium wool and for mutton.

The ewe, an ewe of this breed, will serve to convey an idea of the general appearance of the breed.

These sheep are said to have originated in the seventeenth century, through the introduction of the African or Guinea sheep into the Netherlands, by the Dutch, and modified by subsequent crossing on the native sheep of the country. Wonderful accounts of their excellence and prolific breeding caused their importation into the United States in 1823, 1824, and again in 1863 to New England; but they were not found valuable. The ewes were stated to weigh from 145 to 175 pounds, the rams going 200 pounds. They are prolific, hardy, and produce rather long and medium fine wool, pure white. They are reported to be prolific as breeders of twins, and sometimes as having bred twice a year.

SECTION II.—HAMPSHIRE DOWNS.

The Hampshire Down was originally formed from the white-faced, horned Hampshire and Wiltshire sheep, crossed with Southdown rams of the darkest faces. In time the horns were entirely bred off, the faces darkened, and compactness was secured by careful selection. As we know them now they may be considered as among the most valuable of the Down varieties ever introduced into the United States.

The Hampshire Down of to-day, although classed as a middle woolled sheep, bears a fleece longer than the Southdown, but slightly coarser. The ewes are prolific breeders. Early lambs will weigh, dressed, seventy to eighty pounds in May. Two lambs dropped in January, out of a hundred shown in England lately, weighed, respectively, 149 and 178 pounds.

SECTION III.—OXFORD DOWNS.

The Oxfords are quite a modern breed of sheep. Their history is given as follows:

They were produced by coupling Cotswold rams with Hampshire ewes, occasionally using the Southdown to perfect the cross.

By such a course of breeding, skilfully and carefully continued, an animal of uniform character has been produced, characterized by hardness of constitution, good size, heavy fleece, facility of fattening, and excellent mutton.

CHARACTERISTICS OF OXFORD DOWNS.

The Oxford Downs have gray faces and legs, not quite so dark as the Southdowns; head fine, and well set; small bone, deep brisket, round hams; good, flat backs; hips wide, and tail set up high; belly straight; buttock square; legs rather short and fine, and twist full; the loin is very wide and deep, and a wide spread between the hind legs for the development of the udder. They are exceedingly gentle, quiet, and orderly, never jumping and not inclined to ramble; they are hearty feeders, and will thrive on anything given to them, and bear, better than any other large sheep, scanty pasturage. The ewes very commonly have twins, and suckle them both; the lambs thrive very fast, often reaching one hundred pounds in five months on nothing but milk and grass.

This breed yields a very desirable quality of thick and heavy wool, weighing about seven pounds to the fleece, according to the experience of breeders in this country. Mr. Spooner considers it the result of the most successful attempt at cross-breeding ever made in England. He adduces from certain experiments in feeding of Oxford Downs with Cotswolds, Leicesters, Hampshire Downs, and Southdowns, the apparent fact that these cross-bred varieties surpassed the others in quality and productive value of their mutton, compared with the fleece and flesh of short wools.

The Oxfords may really be classed as between the medium and long woolled sheep, but the Southdown and Hampshire blood being so marked in their make-up, we have placed them among the middle woolled sheep.

SECTION IV.—SHROPSHIRE DOWNS.

This admirable hornless mutton and wool sheep is the old, horned sheep of Shropshire, improved and modified by crosses of Cotswold and Leicester, and later with the Southdown. Careful selection has

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HAMPSHIRE DOWNS EMB.



so improved the breed, that it is universally admired where introduced into the United States. The face and legs as now bred, are a peculiar spotted gray. The fleece is long, glossy, of medium fineness, and will average about seven pounds of clean wool. The Leicester and Southdown have both been strong integers in the improvement of Shropshires.

It is noticeable of the Shropshires, that they take kindly to a great variety of situations. Hence it is not surprising that they have made so many friends in the United States, both in respect to fleece and wool.

SECTION V.—SOUTHDOWNS.

From the fact that the Southdown has been the strong integer in the make-up of all the modern breeds of mutton sheep, and the added fact that its mutton continues to bring the highest price in our city markets, it requires that we give a full description, notwithstanding the fact that Southdowns are really being less and less sought by breeders in both England and America. This is undoubtedly from the fact that now the rage is for size, as it is found to be in every other description of live stock. Nevertheless, when access may be had to the larger cities, Southdown mutton will always sell at a price most profitable to the grower.

The Southdown is one of the oldest of English breeds. The vast improvement in its make-up over those sheep of the last century, in precocity, fecundity, vigor, high and uniform breeding, and well marbled flesh in the valuable parts; this, and the fact that their prepotency is always sure to improve the mutton of any breed with which they are crossed, all goes to account for the constant use of Southdowns in the improvement of the mutton breeds of England.

THE ORIGINAL SOUTHDOWN.

The Southdown of the last century, according to Ellman, was of small size, and far from possessing a good shape, being long and thin in the neck, high on the shoulders, low behind, high on the loins, down on the rumps, the tail set on very low, perpendicular from the hip bones, sharp on the back, the ribs flat, not bowing, narrow in the forequarters, but good in the leg, although having big bones.

THE IMPROVED FORM.

As improved, their characteristics are:

Head small and hornless; the face speckled or gray, and neither too long nor too short; the lips thin

and the space between the eyes and the nose narrow; the under jaw or chop fine and thin; the ears tolerably wide and covered with wool, and the forehead also, and the whole space between the ears well protected by it, as a defense against the fly. The eye full and bright, but not prominent; the orbits of the eye, the eye cap or bone, not too projecting, that it may not form a fatal obstacle in lambing. The neck of a medium length, thin toward the head, but enlarging toward the shoulders, where it should be broad and high and straight in its whole course above and below. The breast should be wide, deep, and projecting forward between the fore-legs, indicating a good constitution and a disposition to thrive. Corresponding with this, the shoulders should be on a level with the back, and not too wide above; they should bow outward from the top to the breast, indicating a springing rib beneath, and leaving room for it. The ribs coming out horizontally from the spine and extending far backward, and the last rib projecting more than others; the back flat from the shoulders to the setting on of the tail; the loin broad and flat; the rump broad, and the tail set on high and nearly on a level with the spine; the hips wide; the space between them and the last rib on either side as narrow as possible, and the ribs generally presenting a circular form like a barrel. The belly as straight as the back. The legs neither too long nor too short; the fore-legs straight from the breast to the foot, not bending inward at the knee, and standing far apart both before and behind; the hock having a direction rather outward, and the twist or the meeting of the thighs behind being peculiarly full; the bones fine, yet having no appearance of weakness, and of a speckled or dark color. The belly well defended with wool, and the wool coming down before and behind to the knee and to the hock; the wool short, close, curled and fine, and free from spiry projecting fibers.

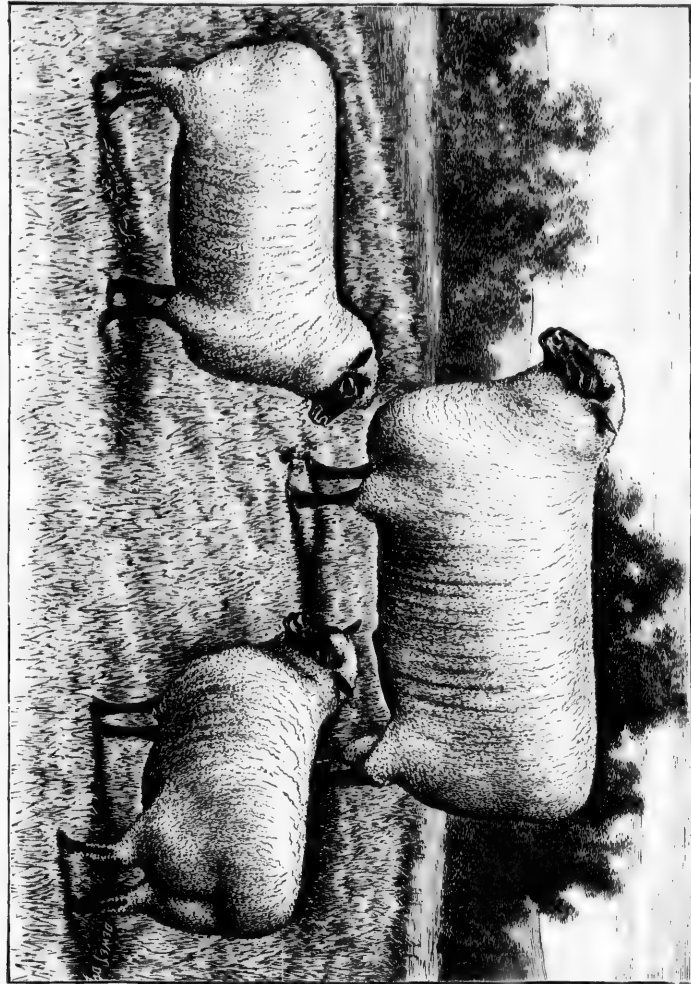
SECTION VI.—OTHER MIDDLE WOOLED BREEDS.

The white-faced Highland sheep of Wales are one of the indigenous breeds of Britain, though the black-faced Highland sheep of Scotland are credited as being the oldest of British breeds. The white are hardy and good nurses; faces white, rusty brown, or speckled with gray; the wool weighing about two pounds per fleece, but remarkable for its quality of not shrinking in washing.

BLACK-FACED HIGHLANDS.

Black-faced Highlands are remarkable principally

GROUP OF HIGH CASTE SOUTH DOWNS.



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The three following breeds we describe from the writings of the authors as noted:

IRISH SHEEP.

The Irish sheep have been much improved by the importation of English rams. Culley describes them as ugly and ill-formed. Bodies large; legs long, thick, crooked, and of a gray color; faces gray; heads long; large, flagging ears; sunken eyes. Neck long, and set on below the shoulders. Breast narrow, short and hollow; flat-sided.

SHETLAND SHEEP.

The Shetland sheep are described by Mr. Wilson as small and handsome; hornless; seldom exceeding forty pounds in weight; hardy—feeding on even seaweed; wool soft and cottony.

HEBRIDEAN SHEEP.

The Hebridean sheep is described by Mr. Wilson as the smallest of its kind. Shape thin and lank; face and legs white; tail short; wool of various colors—bluish-gray, brown, or deep russet. Even when fat, this sheep weighs only twenty pounds. The wool rarely weighs more than one pound.

DORSET SHEEP.

Of this breed, a cut of which we give, and for the reason that they are still regarded as of value in England, we must depend upon the description of Mr. Youatt, from whom we condense:

The pure breed is entirely white; the face long and broad, with a wool tuft on the forehead; the shoulders low and broad; the back straight; the chest deep; the loins broad; the legs rather beyond a moderate length, and the bone small. They are, as their form would indicate, a hardy and useful breed. They are a good folding sheep; their mutton well-flavored, averaging when three years old, from sixteen to thirty pounds a quarter. Their principal distinction and value is the forwardness of the ewes, who take the ram at a much earlier period of the year than any other species, and thus supply the market with mutton at a time when it fetches the highest price.

CHAPTER IV.

LONG-WOOLED SHEEP.

SECTION I.—ABOUT COMBING AND OTHER WOOL.

There are several reasons why the American farmer should turn his attention more and more to the pro-

duction of combing (long) wool and delaine (middle) wool. The great plains, Texas, New Mexico, and the mountain region of the United States generally, all these are especially adapted to the Merino and their modifications. All these regions, South America and Australia, can raise fine wool so much cheaper than it can be raised on cultivated farms, that competition is a losing business. Fashion has also changed in wool for gentlemen's and also for ladies' wear. It is probably permanent. The Merino, and especially the long wools, are being more and more used in manufactures of various kinds. The mutton of the large breeds is more salable than that of the Merino; that of the medium-wooled sheep is comparatively fine, and the wool brings a higher price than Merino. As especially interesting to all wool-growers, and as covering the ground most perfectly in relation to the various varieties and uses of wool, we present the following from an exhaustive account of the quality of wool produced on the globe, by M. Elsner, of Gronow, Silesia, as translated by the late and lamented J. H. Klippart: Our authority says:

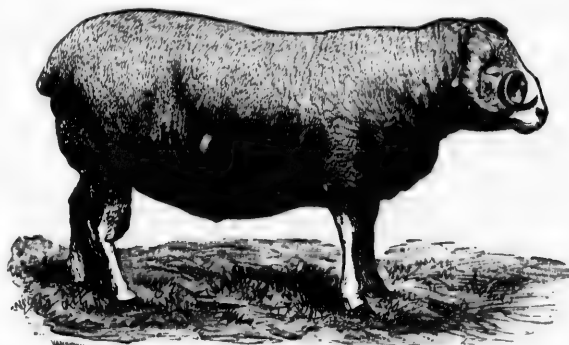
In considering the qualities of the wools and the manner of its realization, we shall, for the present, not refer to the microscopic investigation of the wool-hair or fiber in general, for which we have collected a large amount of material, but which we deem it not yet proper to publish, since our observations differ in too many points from the views of former observers; and, therefore, we must be convinced in advance by repeatedly renewed investigations, as to whether former observers or we are right.

FORMS OF HAIR ON SHEEP.

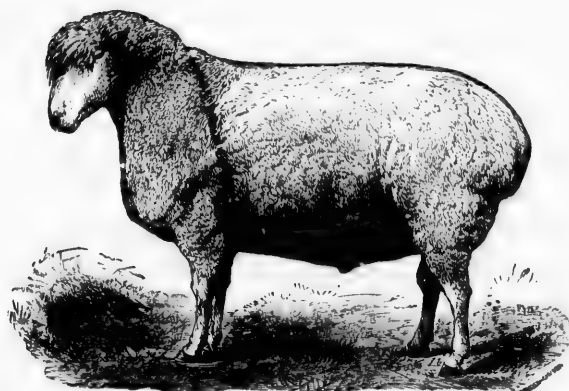
Four forms of hair cover the sheep:

1. The smooth, non-transparent hair found on the face, knees, and lower extremities of all sheep, and sometimes appearing also among the wool, detracting from its value. This short hair has no special value for manufacturing purposes, and at best is preserved among the other offal in the process of tanning, for manuring purposes. This short hair forms the cover of the sheep living near the equatorial zone, whose skins are used for clothing material only, and for sleeping and praying on them.* This

* Thaez (Engl. Agric. IV, p. 731) mentions that Sir Joseph Banks brought such a smooth-haired sheep from Jamaica to England, which was covered with smooth hair two inches in length, and among these there was found a very soft and fine down, like on the deer.



DORSET RAM.



COTSWOLD OF THE LAST CENTURY.

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form of hair, therefore, is excluded when we examine the wools.

2. The Zackelwool.—When the sheep comes into more northern regions, especially into such as have considerable watery precipitations in certain seasons, a form of hair is formed on the sheep which, without undulation, has traces of scales, and is tolerably transparent—a form of hair which, like the hair of goats, especially the Angora goats, and the upper hair of camels and Anchenia, is eminently suitable for protecting the body against changes in the temperature, and being long and smooth, it promotes a rapid escape of the fallen rain water and a speedy drying of the skin. Under these Zackelhairs the third class is formed.

3. The down, a much finer hair of greater density, regularly covered with scales, spirally curved and undulating, grows the more abundantly the greater the changes in the temperature to which the wool-bearing animal is exposed; is denser in winter than in summer; and on account of its curvature and fineness, is eminently fit to keep the animal warm.

Between this and the Zackelhair is developed the transitory form of ordinary wool, which, being long, presents the character of the Zackelhair in a state of transition to the down.

These various forms are produced, either by climatic influences alone, or by these and the careful keeping of the animals by man, combined.

VARIETIES AND VARIATION IN WOOL.

Thus, from the sheep of the Zackel, or lock form, the Merino sheep originated; and, of necessity, had to originate, in Spain, because its formation required a rainless climate; in this climate the long, smooth Zackel hair being destined to keep the rain from the down, to cover this like a roof and let the rain run off, became necessary; nature let it grow weaker, and finally gave it only to new-born lambs, and produced in the Merino sheep a sheep bearing a mere down rather than hair. When the Merino sheep is transferred into regions having a more copious rainfall than Spain, and is not completely protected from rain, nature tries to reproduce the lost protection against rain, not by causing new Zackel hairs to grow, but by making the Merino down hair larger, so that it hangs down on both sides of the body, and lapping over each other causes the rain to run off.

Therefore, Merino wool has attained an extraor-

dinary length in the wet climate of England; therefore the English Merino wool grows still larger in the still wetter and warmer climate of New Zealand; therefore it grows always longer when sheep, which never were exposed to rain, come into districts where they are less carefully kept, and frequently exposed to the fall of water; therefore, finally, the Merino wool remains short and retains its downy character when the Merino sheep is taken into rainless regions, even if it there is kept and tended with less care than before—as, for instance, to the Cape of Good Hope, to the interior of Australia, and into the dry regions of South America.

What is true in regard to the Merino wool, holds good also for all downy wools, for the down wools of East Dorset are shorter than those of Middle, South and West Dorset, simply because those portions of Dorset have more rain than the eastern portion; but this is shown in the most striking manner by the Southdown wools from rainy Ireland, when compared with the Southdown wools of England. On the back and sides they grow six to eight inches long, while the belly wool remains unchanged, because no rain falls on it, and therefore it need not grow longer to facilitate the running off of the water. But in the sheep races having pure down, nature always shows a tendency to produce below the longer down a shorter one, finer than the larger one; therefore, in any sample of wool, the shortest hairs are always finer than the longer ones; therefore, the wool taken out by the comb is finer than that going through the comb.

CLASSES OF WOOLS.

The wool fibers of different qualities are divided into five different classes for manufacturing purposes.

1. Such as being long and smooth may be spun like flax, and give a lustrous, smooth thread—comb-wools proper; the length, fineness and luster of the hair are the conditions of its value.

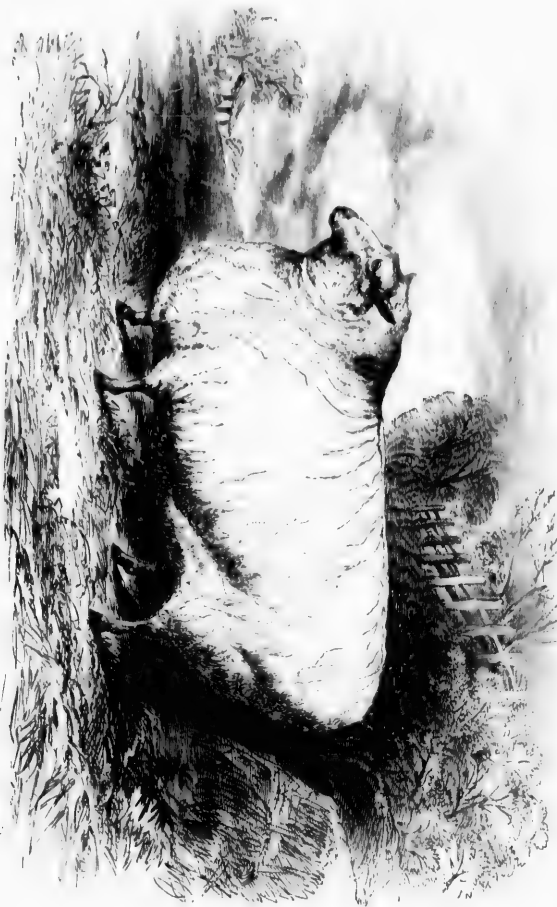
2. Such as have a long, but no smooth hair—feeble comb-wools.

3. Such as consist of a mixture of smooth and curly hairs of various dimensions—improper comb-wools.

4. Such as give but a rough thread and require the process of felting to obtain the necessary density of the texture—cloth wools, card wools.

5. Such as may properly be used only for felting,

A LINCOLN EWE.



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without being spun previously, which generally form a mixture of short upper hairs and downs.

The value of the wool for the manufacturer is conditioned:

1. Chiefly by the quantity of clear wool fiber contained in a given quantity of raw wool. 2. By the nature of the dirt in it. 3. By the length of the hair. 4. By the luster of the same. 5. By the fineness of the wool. 6. By the softness of the same. 7. By the power of the hair. 8. By the regular structure of the fleece. 9. By the color. 10. By the manufacturing purpose.

It is needless to show to what extent the value of wool is conditioned by its quantity of clear wool-fiber contained in a given quantity of raw wool. The manufacturer and the wool dealer have, through long experience, acquired so great a skill in judging this property, that the price of wool of the same quality as to the wool-fiber varies but little, whatever may be the dirt contained in it.

SECTION II.—LINCOLN SHEEP.

The Lincoln is essentially a fat sheep, but has also plenty of meat. This breed is also the largest of the various English breeds, weighing up to 160 pounds at two years old, and occasionally dressing to weigh ninety pounds per quarter. The wool is often nine inches long, exceedingly lustrous, and weighing sometimes twelve to fifteen pounds per fleece. Lincolns are hardy, prolific, but great feeders, and hence they require the best pastures; and, also, high feeding in winter. They have been known in the United States for fifty years, but have not become widely disseminated, the Cotswolds being generally preferred. It is more than probable, however, in consequence of very long wool being more and more called for, that, when the necessary care and attention can be given them, or when high farming is practiced, they may be found valuable. As mutton sheep their great size will, however, be against them in American markets. The fat of the Lincoln is more internal, however, than either that of the Leicester or the Cotswold. Hence, as mutton sheep, they are superior to either of these breeds, but on the other hand the Cotswold and Leicester breeds combine the essentials of Lincoln wool. The cut will show the type of this Lincoln sheep.

The west, with its dry summer and autumn climate, and its dry but cold winters should prove admirably adapted to these sheep, as indeed it has

proved to be to sheep generally, and certainly in no other part of the world may be found so luxuriant and cheap food.

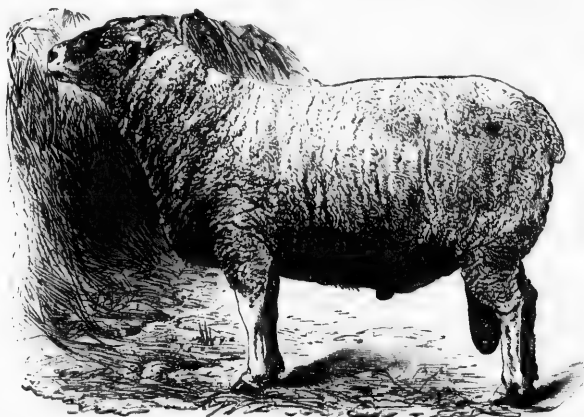
SECTION III.—LEICESTER SHEEP.

The old Leicester sheep, before the experiments made to improve them by Bakewell, of Dishley, commenced in 1755, and continued until they became the most famous sheep in England, was an animal of large frame, with heavy bone and coarse-grained meat, a flat-sided carcass, and legs large and rough. It was a slow feeder and necessarily late in reaching maturity, weighing at two or three years old, 100 to 120 pounds.

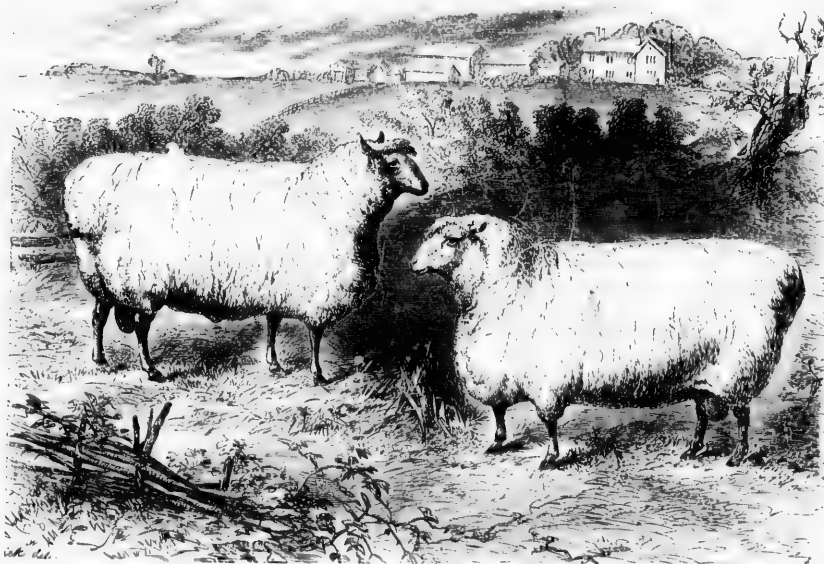
Let us compare this description with that of Youatt, who knew them after they had been brought to their high state of excellence. This accurate writer gives their points as known in his day as follows:

"The head should be hornless, long, small, tapering toward the muzzle, and projecting horizontally forward. The eyes prominent, but with a quiet expression. The ears thin, rather long, and directed backward. The neck full and broad at its base, where it proceeds from the chest, so that there is, with the slightest possible elevation, one continued horizontal line from the rump to the poll. The breast broad and round, and no uneven or angular formation where the shoulders join either neck or the back; particularly no rising of the withers or hollow behind the situation of these bones. The arm fleshy through its whole extent, and even down to the knee. The bones of the leg small, standing wide apart; no looseness of skin about them, and comparatively bare of wool. The chest and barrel at once deep and round, the ribs forming a considerable arch from the spine, so as in some cases, and especially when the animal is in good condition, to make the apparent width of the chest even greater than the depth. The barrel ribbed well home; no irregularity of line on the back or belly, but on the sides; the carcass very gradually diminishing in width toward the rump. The quarters long and full, and, as with the forelegs, the muscles extending down to the hock; the thighs also wide and full. The legs of a moderate length; the pelt also moderately thin, but soft and elastic, and covered with a good quantity of white wool."

From the fact that the Leicesters have been one of the most noted of English breeds in the improvement of the long-wooled modern breeds, we introduce



ENGLISH SOUTH DOWN, (Winter Condition.)



IMPROVED COTSWOLD RAMS.

a condensed history of the breed in the United States from the Encyclopedia of American Agriculture:

"The earliest record of this breed (Leicester) in the United States is a mention by Custis of the Bakewell ewes on the estate of Washington, from which, through a cross by a Persian ram, was derived the somewhat famous Arlington long-wooled sheep. The influence of this and other long-wool flocks of Virginia gave a popularity to the English races which has continued to the present day, though the preference at present appears to be given to the Merinos, especially since the war and its accompanying destitution and lack of thrift. Kentucky also gives a preference to the Leicester, as a fit companion to the Shorthorn bullock upon the blue-grass pastures. They are to be found in small numbers in the middle and Ohio Valley states, generally in a semi-degenerate state, not bred up to the moderate standard of the perfect Leicester in his English home. The mutton of Leicesters is too fat to suit American taste, yet that of grades is quite palatable, though coarse-grained, with too much outside fat. Even in England meat of animals two years old is less valuable than that of lambs or shearings; and the price is always materially lower than mutton of South-downs and the mountain races.

BORDER LEICESTERS.

"More than a century ago some of the sheep-folds of the border were reinforced by Liecestershire sheep of established repute. Early in the present century representatives of the Dishley stud began a contribution to the improvement, which has been continued till they have won a distinct position in the show-yard and in popular esteem.

CHARACTERISTICS.

"The characteristics of this breed, as given by Mr. John Wilson, are extraordinary aptitude to fatten and early maturity. He says: The most marked feature in their structure is the smallness of their heads and of their bones generally, as contrasted with their weight of carcass. They are clean in the jaws, with a full eye, thin ears and placid countenance. Their backs are straight, broad and flat; the ribs arched, the belly carried very light, so that they present nearly as straight a line below as above; the chest is wide, the skin very mellow, and covered with a beautiful fleece of long, soft wool, which weighs, on the average, from six to seven pounds. On good soils, and under careful treatment, these

sheep are currently brought to weigh from eighteen to twenty pounds a quarter at fourteen months old, at which age they are now generally slaughtered. At this age their flesh is tender and juicy, but when carried on until they are older and heavier, fat accumulates so unduly in proportion to the lean meat as to detract from its palatableness and market value."

SECTION IV.—COTSWOLD SHEEP.

There are no representatives of the long-wooled breeds of England that have been received with greater favor, or been more widely disseminated in the United States, than the Cotswold, and especially so in the west. The reason is they are of great size, strong of constitution, fairly prolific, and seem to have the quality of adapting themselves to a greater diversity of soils and situations than any other of the long-wooled breeds introduced. The engraving of Cotswold rams are portraits of this famous breed and shown in ordinary flesh.

The history of the Cotswold breed has been summarized as follows:

The Cotswolds, of the county of Gloucester, England, are of great antiquity, but have been greatly modified and improved within twenty years. They are sometimes called Gloucesters, sometimes New Oxfordshires. There has been a variety known by the latter name, made by crossing Leicester bucks upon the Cotswold ewes; but the distinction between them and the Cotswolds is not now recognized in England, the original stock being nearly extinct, and the new breed being known as improved Cotswolds. They are greatly superior to the Leicester in weight of wool, size, hardiness, vitality; are much more prolific, many of them habitually bearing twins, and excellent as nurses. Their fleeces are somewhat heavier than the Leicester, usually averaging seven or eight pounds. They are possessed of a good figure and have a portly gait. The rams sometimes attain the weight of 300 pounds, and one is known to have weighed 374 pounds. The wool is of moderate fineness, long, white and strong. They have a long, thin head, well set on, broad chest, well rounded barrel, and straight back. For rapidity of growth they vie with the Leicester, can scarcely be excelled for docility, and are unsurpassed in size and weight. Their mutton is coarse-grained and very fat, but better intermixed than the Leicester, which has three or four and sometimes five or six inches of fat upon the outside, as fed in England. They are now ex-

tensively used for crossing with other sheep, to obtain early lambs for market, both in this and in the mother country, and are rising rapidly in public estimation. For rich pastures, in regions where grain is abundant and cheap, they are invaluable, and especially to be preferred in view of the roughness and negligence characterizing the American system, or rather want of system, of sheep husbandry, to the pampered and delicate Leicesters. They have been in the country for fifty years or more, and are now largely imported from Canada.

The history of the improvement of the Cotswolds we have condensed as being valuable:

As a breed it is of the greatest antiquity, and one of the largest of the English breeds. The improved Cotswold is smaller than the original race on account of the influence of the Leicester element in its amelioration. It has gained in fleece and form, and comes to maturity earlier; is more prolific than the Leicester, and has greater strength of constitution; is often fattened at fourteen months, yielding fifteen to twenty pounds per quarter, and twenty to thirty if kept till two years old. The fleece is six to eight inches in length, and sometimes much longer; is strong, somewhat coarse, of good color, and yields a heavy fleece. The mutton is superior to that of the Leicester, with a smaller proportion of fat, and the sheep are also superior to that popular breed in weight of wool, size, hardiness, and vitality. They are possessed of good figure, have a large head, well set on, a broad chest, a well-rounded barrel, and a straight back. They are often used for crossing upon other breeds, and for obtaining earlier market lambs, both in this country and in Europe. They are more widely disseminated in this country than any other long-wool, and preserve well the popularity which they have attained here.

The fleeces are heavy, reaching eighteen pounds, and the wool, from the absence of grease or gum, loses comparatively little in scouring. The wool is well adapted to combing from its great length, and the mutton, although very fat when the animal is mature, is nevertheless of good quality.

THREE MARKED GRADES OF LONG-WOOL.

To sum up the whole matter of long-wooled sheep it is regarded in England, where the humid climate is favorable to the production of fleeces of great length of wool, that the best representation of nice combing wool is the Lincolnshire sheep, and it is one

of the largest sheep races in England. The next in rank for a long-wooled sheep, in England, is the Leicester, which is the most generally distributed combing wool race of that country. It is also the most tender of the large English races, and its early maturity and great fattening propensity are its chief qualities. The third in rank of combing wools are the Cotswolds, which are a vigorous and hardy race.

SECTION V.—OTHER LONG-WOOLED BREEDS.

A breed of sheep called Improved Kentucky sheep, is localized in some portions of that state and Tennessee, said originally to have been found by breeding a large Merino ram upon thirty selected sheep of the common mixed blood of the country. The ewe progeny were then bred to an imported Bakewell (Leicester); the ewes of this cross to an imported Southdown; the next cross used being a three-fourths Cotswold and one-fourth Southdown ram. In 1855 a mixed ram was used, said to contain Cotswold, Oxfordshire, Teeswater and Southdown blood. In 1856 a Cotswold was bred to this mixed race, and since that time, or from 1860 to 1865, the date when the account was written, Cotswold and Leicester blood was used.

These sheep look much like Cotswolds, but of course with such incongruous breeding, little uniformity could be attained. We make the statement of the breeding to warn others not to attempt to produce a valuable breed by such means. There is, in fact, no chance of making a better than existing breeds by commencing with common mixed ewes. Their true place is to breed half and three-quarter bred sheep from any of the improved breeds selected. In the meanwhile the farmer should be breeding to one, two, or more pure ewes, that in time he may have pure sheep of whatever race may be selected. Had the originator of the Improved Kentucky sheep pursued this plan, while he would have secured most valuable animals for wool and mutton, at a day when good animals were scarce, he would also have bred up a pure race, at the same time the descendants of a pure race that would to-day have stood foremost with those in his state. The average farmer, however, wants to breed up his common sheep. It is easy and simple enough, and the rule will apply to all live stock.

HOW TO BREED GRADES.

Many persons hesitate to buy superior male animals for two principal reasons. One is, they imag-

ine that the improvement is not marked; and the second is, they imagine that their stock will always be something far below the pure or thoroughbred stock. Both of these propositions are grave mistakes. The improvement is marked in the first cross, really more so than in the succeeding ones, and the fourth cross will give animals that none but the most critical judges can distinguish from pedigreed ones of high caste. Let us examine this question, the facts of which are well-known to all experienced breeders, and, as an object lesson, place it in tabulated form:

	SIRE.	DAM.	RESULT, PURE BLOOD.
First generation.....	1	0	
Second generation....	1	1	
Third generation....	1	1	
Fourth generation....	1	1	15-16

In all these generations the sire is of pure blood. In the first generation the result is a half-blood. This, if a female, is bred to a pure animal, and the result is a three-fourths blood, etc.

HOW LONG WILL IT TAKE?

Suppose you begin with your flock this fall, next spring you have your half-bloods as the progeny. The next autumn the ewe lambs may be bred, though it is not altogether good practice to be followed up, but you want a flock. In 1885 you have three-quarters bred lambs. In 1886, seven-eighths; and in 1887 fifteen-sixteenths bred sheep. If you allow the ewes to be eighteen months old before breeding them, then the second cross will be had in 1886, the third in 1888, and the fourth in 1890. Seven years is not a long time to wait for a flock of sheep that will grade handsomely with the average of a given pure breed. But you want good mutton and good wool that will sell quickly? The first Cotswold cross will give you fair combing wool, so will the Leicesters, the Lincolns, the Oxfords, or the Romney Marsh sheep.

If mutton is to be a distinctive product, select as sires any of the Downs that may seem best adapted to your locality.

ROMNEY MARSH SHEEP.

The only other breed of long-wooled sheep that seems necessary to notice here is the Romney Marsh. They are little known in the United States, and will probably never be particularly sought after.

It is described as a large sheep, not very symmetrical in form, having narrow fore-quarters and flat

sides, and coarse bone and muscle. It has a white face, a long and thick head, and a tuft of wool on the forehead. The wool is of more value than the mutton, perhaps, (but would not be profitable without it,) being long, fine and lustrous. The ewes are prolific, about thirty per cent of doubles being expected in reproduction. The lambs come late, after the severity of the winter is over.

With good feeding after the first wintering they can be brought to seventeen pounds, sometimes to eighteen pounds per quarter; yet they are more frequently kept a second winter. They are not very early in maturing, and grass is the main reliance for growth, if not for fattening.

CHAPTER V.

CARE AND MANAGEMENT OF SHEEP.

SECTION I.—A WOOL AND MUTTON PROBLEM.

The preceding chapters have given a detailed account of the derivation of breeds, classification by texture of wool, and including the characteristics of sheep both as wool and mutton producers. The space devoted thereto was considered absolutely necessary in connection with the important matter following, relating to the management of sheep and lambs, flocking, shearing, marketing, shelter, feeding, treating and breeding. The study of wool and its proper classification is of the first importance to breeders, since whatever the breed of sheep, whether they be distinctively mutton or distinctively wool breeds, the wool is always the second important integer in profits, and in all fine woolled breeds the most important.

GUIDING PRINCIPLES.

The breeder of sheep and wool must be guided by many considerations in the selection of breeds. Fine woolled sheep, especially the American Merino, may be kept in large flocks. In the United States no other valuable breeds have been found that would do well in immense flocks, such as must be kept in all the great plains region of the United States. They are also the most valuable of the fine woolled sheep for the farm in thickly settled regions adapted to the growth of wool. Near cities, or contiguous to markets where fine mutton is sought, the breeder must carefully study the relative difference in price as between fleece and carcass in connection with the cost of keeping, of the relatively inferior mutton of the

merino as compared with the best mutton breeds, and this in connection with the value of the fleece, and *vice versa*. It is simply a question of study and figuring, and this each one must do for himself.

SECTION II.—SMALL FLOCKS.

The management of small flocks of sheep on average farms is exceedingly simple. They are not subject to diseases, especially contagious diseases, as in the case of large flocks. They eat much herbage that other animals refuse, are great exterminators of weeds, their manure is especially valuable, and for the reason it is easily absorbed where it is dropped.

SOME FACTS IN SHEEP HUSBANDRY.

Sheep may run with cattle if both drove and flock are small. Flocks are not so subject to the depredations of dogs in thickly settled neighborhoods, and for this reason; so many half-starved curs are not kept. If a bell to each ten sheep is worn, the ringing will caution the average dog. When kept with cattle and used to them, sheep instinctively seek their company when frightened.

EXAMINATION FOR DISABILITY.

Whether the flock be large or small, whoever has charge of the flock should examine them daily, especially for lameness. If a sheep is found lame from any cause, the time to assist it—even from an economical standpoint—is as early as possible. Catch it. It may be gravel in the cleft of the hoof. It is easily removed. If it be foul, or incipient rot, the time to give relief is immediately.

SUMMER AND WINTER MANAGEMENT.

Any pasture dry enough for cattle will do for sheep; that is, dry pastures. Sheep should never be kept on wet land. When the ordinary pastures are soft, remove them to the dryest on the farm. If the pasture contains both wet and dry land, sheep will naturally seek the highest and firmest portions. In winter sheep must be sheltered from storms and severe wind, yet they must have plenty of air. They do best in open, low, well-littered sheds where they may be secure from wind and wet. The shed must be provided with a suitable rack for hay, and with a trough underneath to catch the waste. In this the grain and roots allowed may also be fed. Sheep must be kept uniformly well. They must not be allowed to fall away. It injures the wool. Sheep that are kept uniformly thriving have no weak places

in the wool. They should not be too much crowded, and the wethers should be separated from the ewes, and the weak from the strong. If only fifty are kept, divide them in the winter into two flocks.

MANAGEMENT OF RAMS.

Never allow rams to run with the ewes except in tupping time. They are among the most brutal of the animal creation. The proper plan is to keep rams always by themselves and allow them with the ewes but a short period morning and night. As soon as one ewe is served mark it and turn it out from the rest, and mark the date in the register. If served again, re-mark, and note the last service in the register. It will assist very much, not only as reference from time to time, but especially when the ewes are nearly ready to yearn. It is absolutely necessary in all large flocks, and especially so in those of purely bred flocks, whatever the number. The rams here are too valuable to be allowed their liberty, and the ewes and their progeny certainly should not be teased by their brutal pertinacity. Hence no good flock-master allows such rams their liberty. There is no practical reason why any ram should not be kept separate from the flock.

RATIONS FOR SHEEP.

If roots are fed daily, one bushel, chopped fine, fifteen pounds of grain, one hundred pounds of good hay and what straw they will eat will keep fifty merinos in good condition if they come to the sheds in good flesh in winter. It will be most economical to feed the roots in the morning. If there are no roots, ensilage may be substituted and the grain fed at night. Hay should be fed three times a day.

SECTION III.—MANAGEMENT OF LARGE FLOCKS.

The master of large flocks will of course be guided by circumstances. There is no profit in keeping sheep as the exclusive stock on fenced farms. The great value of sheep in well-settled districts is in their economy as a part of the farm stock. In this day of strong demand for fine mutton there is more profit in the mutton breeds than in the fine woolled breeds, and the wool brings about as good a price as that of the fine wools. The sheep industry of the plains has grown into such great proportions that the small farmer can compete less and less with the growers of fine wool on large ranches. There is money, however, in such a number of sheep as a farm may carry in connection with other stock.

The profits from mutton sheep will increase from year to year as population and the wealth of cities increase.

FINE WOOLED FLOCKS.

Keeping of sheep on an open range is a very different industry from the keeping of sheep on farms. Let us see what the experience of the best flock-masters of the world says. One of the best of the large flock-masters of the West, the late S. P. Boardman, one of the early large flock-masters of central Illinois, at a period when great tracts of territory were uncultivated, testified that sheep brought West, from the East, would increase considerably in the weight of their wool. This is our own observation in northern Illinois, thirty years ago, where flocks of 1,000 to 5,000 "in a bunch" were kept. The reason was the summer pasture was ample and unrestricted, and the winter feeding and shelter the very best.

SUMMER MANAGEMENT OF A LARGE FLOCK.

Mr. Boardman was a most experienced and practically educated sheepmaster. His methods were adapted to a prairie region, and a modification will easily be suggested to the practical man, to suit his particular circumstances.

RANGE.

As to range, it may be high, rolling prairie or dry plains, with never-failing water running through it. The same territory, with the wild grasses destroyed and set with blue and other nutritious grasses natural to arable land, is a better range, of course.

TURNING OUT IN THE SPRING.

Our authority says: In the East the first thing which properly comes under the head of summer management is the operation of tagging, which is performed on the entire flock before they pass out of winter quarters on to grass. In pasturing sheep on prairie grass, this is unnecessary except with a few sheep. The reason is, that the prairie grasses are more binding in their nature, so that relatively but a few sheep scour. In the West, as soon as the prairie grass starts, the sheep are put on it, no matter how short it may be; for, if the range is wide enough, the sheep will, by traveling over a large territory, and by dint of busy feeding become filled by night. By reason of the wide scope of ground, they can be put on the grass some days before one unused to it would think there was even a sheep bite. In herding, the shepherd turns the sheep out of the fold as soon as

light in hot weather, and follows them till dark, when they are brought into the fold. Folding is necessary only where wolves and their cousins, cubs, are troublesome.

HERDING.

All that is necessary in herding a "dry flock" is to have a trusty hand who will get his flock out early enough in the morning, keep them out late enough in the evening, and who will not "bunch" the sheep with his dog too long while he is idling. Before turning out of the fold in the morning, if the shepherd discovers sheep which are scouring, he catches and tags them. The flock is to be salted at the rate of about forty pounds of salt to the thousand, once a week, choosing a particular day, to which day they soon learn to call the shepherd's attention by unusual bleating. If one has many sheep, it is better, if compelled to raise lambs on the prairie, to herd breeding ewes by themselves.

LAMMING.

Raising lambs is the most important, and requires the most skill, care and attention of anything connected with keeping sheep. When we are compelled to raise lambs on the range, we prefer not to have them commence dropping before the first of May, or until the worst cold storms are past, and there is a good bite of grass. It requires much labor to raise lambs on the prairie, especially when all must be folded every night. When from twenty to sixty lambs are coming every twenty-four hours, the shepherd needs assistance in getting the flock to the fold in the evening, and it is necessary, also, that he should be up with them occasionally through the night. It is a good plan where one is compelled to raise lambs under such circumstances to have some panels of portable picket fence, the pickets to be five or six feet high (which will turn any dog or wolf), with which to make pens, into which may be driven those ewes which have dropped lambs through the day. This avoids the necessity of driving or carrying such lambs up to the fold. If there are twenty or more young lambs dropped during the day, it is better to put them in four or five pens, for ewes having lambs dropped about the same time, if put in the same pen, are frequently puzzled to tell their own; and sometimes two ewes get to owning the same lamb, and by morning the cast-off lamb is dead for want of milk. Ewes, as shepherds know, tell their lambs by the

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scent till they are two or three weeks old, after which they learn their bleat. Ewes which drop lambs through the night in the fold are left in it the next day. Raising lambs on the range requires the best kind of a shepherd—one who is never at fault to tell which lamb belongs to which ewe; who can catch any sheep or lamb without yarding the flock; who can go with but little sleep, and who never gets tired.

Flock-masters should be prepared with pastures, sheds, yards, and other conveniences, which make "lambing-time" less to be dreaded than formerly, although one of no less labor and watchfulness than in past time. Where prepared with sheds and pastures do not send the ewe flock off to the range till the lambs are dropped, and all able to travel. Have a large shed into which to put the lambing flock in bad nights, and other sheds into which to put the ewes having lambed. Those ewes which lamb at night are put with their lambs in a yard or pasture by themselves; those lambing through the day are put by themselves, and so from night to day, and from day to night, as long as there are fields enough to keep them separate.

SECTION IV.—THE SHEPHERD'S ART.

The great art of raising large flocks of lambs consists in keeping them separated as much as possible while the lambs are young. When all the fields have got a bunch of ewes and lambs in them, the oldest bunches are doubled to make room for younger lots. This arrangement makes it easier for the shepherd to keep the run of them. It is his business to visit these different bunches two or three times a day, to see that all is going right; that all the ewes own their lambs; that none are claiming others' lambs; that all the lambs suck, and if any of them are becoming "pinned," to clean and rub some dry dirt about the anus. The greater part of the shepherd's time is spent at the large shed in which the lambing takes place. On turning the flock out in the morning he finds (depending on the number of his ewes) from fifteen to fifty lambs, which have dropped through the night. He has now to slip them out of the flock and see that each ewe owns her lamb, and must also watch till he sees every lamb suck. Frequently a ewe's teats are so stopped that a weak lamb cannot draw the milk, in which case the shepherd catches her and starts it, suckling the lamb at the same time. A lamb which gets up when dropped and suckles it-

self is half raised if proper watchfulness is observed afterward.

FOSTER MOTHERS.

In the "factory" are a number of small pens into which to put ewes which will not own their lambs, or to put ewes having lost lambs, to make them take a twin lamb. This is done by skinning the dead lamb and putting the skin on the live one. As soon as the ewe can be made to own her lamb she is put out with one of the small bunches, first having been marked on some part of the body with red keel, the lamb receiving a corresponding mark. When a ewe owns a "jacketed" lamb she is put out, the jacket hung up over her pen, and, if on trial she proves refractory, the jacket is again put on the lamb, when a second penning for two or three days will generally break her in. With a flock of one thousand or more breeding ewes, it is customary for the shepherd and his assistant to be up by turns a great share of the night. In pleasant weather the lambs are allowed to drop in the feed lot or pasture; but even then the shepherd should be with the flock constantly.

WATCHFULNESS NECESSARY.

When there is not pasture on the farm sufficient to keep the ewes till after shearing, they are sent off to the range under the care of a trusty shepherd. A ewe-flock requires constant watching to see that no lambs lie down behind a stool of grass, get asleep, and so get left by the flock. A good many lambs may be lost by a careless shepherd from this cause; for a lamb, on awaking and finding itself lost, starts and runs in whatever direction it may happen to take.

DOCKING AND CASTRATING.

We generally make one job of docking and castrating, although, where a large number of lambs are raised, it might be better to make two of it, provided the ewes have been kept in two or more flocks, so there need be no danger of mixing ewes and lambs. The lambs are first caught out from the ewes and put by themselves. The shepherd performs the castration, another hand doing the docking. Three or four hands catch the lambs and bring them up. It is best to commence early in the morning, and have help enough so all may be attended to in the forenoon, as they bleed less when it is cool. With one hand to dock, and help enough to catch, an active

shepherd can alter four or five hundred in a long half day.

WASHING.

It is not often that we can get a running brook with full sufficient to enable us to wash in a tank, as is practical in many places East. Where one has such a branch on his own farm, and can thus have permanent yards and fixtures for washing, he is very fortunate, as frequently in the West a flock has to be driven five or ten miles to a creek. The most general practice is to drive to some creek, make a yard on the bank, and wash after the old manner. One thousand are commonly washed in a day; and those who have flocks from two to five thousand, generally make from two to four washings, from a week to ten days apart, depending on their shearing force. This is in order that the wool need not get dirty, as shearing lasts from two to six weeks. It is best to wash the ewe flock first, in order that it may be sheared first, since carrying a fleece late in June is particularly severe on ewes suckling lambs. If the ewes can all be washed in half a day, it is best to leave the lambs at home, either shut up in a shed or small field, so they may be found by the ewes readily when they return; but if it will take all day to wash the ewes, it is best to take the lambs along. The flock is driven into a yard which has a cat-bing-pen on the brink of the stream, into which fifty to one hundred are driven, then caught and tossed in by two men as fast as six to ten can wash.

WASHING VERSUS UNWASHED WOOL.

In relation to washing wool, when Mr. Boardman wrote washing was almost universal, now it is not so. The cheapest place to scour wool, unless in the case of long and expensive transportation, we believe to be at the factory. It saves much discomfort and disability to sheep. Flock-masters are finding that they really get more per fleece for unwashed wool, if honestly sorted and packed, than if washed. The price per pound is less; per fleece it is not. Washing in clear water never does away with scouring.

SECTION V.—WINTERING THE FLOCK.

There should be some provision for winter feeding of sheep, even in those plains regions where food is plenty (?) the year round. Northers, blizzards and other storms must at least be provided against. There should also be some provision of succulent food for weaned lambs, until they take to dry food

readily, as the season advances. The Hon. T. B. Grinnell, of Iowa, who has had large experience with sheep, gives common sense advice on wintering. We use it for the reason that we had rather give the experience of good practical experts, condensed, than what we have learned ourselves. One thing, however, should be kept in mind, let the flocks be well prepared for winter. It certainly is half the wintering, for it has come under our constant observation that the man who allows his flock to suffer in autumn, seldom feeds well in the winter. He generally shears bad fleeces in the spring. But to return to our authority.

MR. GRINNELL'S ADVICE.

The early frosts will destroy our native grass, and then oats in the sheaf may be fed, and the stubble-land may be pastured, but to make it certain that the fat taken on in the summer is kept there at the latest day possible, cultivated grasses should be laid down, and be reserved for the flock after the prairie grass is frosted. Rye, too, may be sown as a substitute for grass. For lambs it is most admirably adapted. It may be sown among the corn, and on the approach of Winter it will be found that the lambs have learned by degrees to eat the corn and to have attained an astonishing growth at late autumn.

Winter being upon us, it is the time for sorting. Lambs should always be folded separate. Yearlings having weak teeth should, if there is a flock of over one hundred, be fed by themselves. Large wethers should be sorted out from the ewes, and the breeding-ewes put in a pen of such dimensions, with gates, that they may be handled with ease, and when in season, served with promptness and marked, that the time of their lambing may be known, and the sire of their offspring. Once in two weeks the teasers may be turned in, to find such as may have escaped impregnation. It is never a good practice to let the buck run at large with the ewes, but where there are no more than thirty or forty ewes, after the first week, it will do. If economy and care are used, a full-grown buck will serve from fifty to one hundred ewes.

Every good shepherd will have a hospital flock, on which he will bestow extra attention, and to which he will add from time to time such as are drooping, or are pushed aside from their grain, or are doing poorly from any cause.

WINTER SHELTER.

Sheds which will keep out the wind and rain are essential. When boards are not to be had, poles and a good covering of straw will be a substitute for one or two winters. I am not partial to close confinement in tight sheds, except it is a necessity to keep the flocks from wolves or dogs, or to keep the ewes from exposure in lambing time. Let the sheds be low and open on the south side, and if the extreme cold for a long period pinches and impoverishes the flock, increase the feed of grain and you restore the warmth and arrest the decline. Cold is favorable to a good growth of wool, but to economize food and insure the health of the flock the more even the temperature the better.

A good feeder will have hay-boxes and grain-troughs. The flocks may live if fed on the ground, but nothing less than keen hunger will force so delicate an animal to take its food from the wet and filth of the yard. The racks will more than pay their cost by a saving of hay in one winter, and if grain not in the sheaf or ear is fed for more than one-half the season, troughs will be an imperative necessity.

VARY THE FOOD.

It is a part of good management to indulge the tastes of the flock. Why should the sheep be confined to the same variety of food from month to month, a treatment which we would deem a hardship? Every pioneer farmer can cut prairie grass, which is a suitable, well-relished food, and Hungarian hay cut early is very nutritious; then he may make up a variety by feeding oats in the sheaf, timothy hay, and corn cut before frosts and fed in the bulk. Many well-wintered flocks have subsisted on cut-up corn mainly, which has increased the weight of the fleece above that attained by ordinary keeping full twenty per cent. There is no excuse for having poor stock, if they are fed three times a day, and furnished with salt and good water and such varieties of food as our country readily furnishes.

DO NOT TURN OUT TOO EARLY.

So soon as the snow has passed off in the Spring, there is a strong temptation to let the flock out on the ground and effect a saving of expense in feeding. This is a ruinous practice. Fasting becomes a necessity, if there is not grass, and the flock is returned to dry hay, wasted in flesh, and with a loss of appetite, when the breeding ewes especially should have re-

ceived extra attentions by a daily feeding of roots or bran, that there might be an abundance of milk for the lambs.

If the lambing season does not begin before there is a good bite of grass, the shepherd will be spared much of vexatious care, but under the most favorable circumstances it will be found the poorest economy to forego personal attentions for a single day. Occasionally a ewe will sink under the labor of parturition, and must be relieved. Often the best sheep will refuse to let the lamb suck because of the distension and inflammation of the udder, and for several days the milk must be drawn away by hand. In the case of abortions, malformations and the birth of twins or the loss of a mother, there will be found enough of nursing and mating to give a profitable employment.

SECTION VI.—SHEARING AND MARKETING WOOL.

Boys should learn to shear. It is not common for a man advanced even to middle life to take up the business successfully. The learner must be patient, and content to clip a small amount of wool for the first few days. Neither violence nor a great amount of strength will be required if the sheep is kept "on end," and practice will soon show that the position is the natural one, preventing successful struggles on the part of the sheep, and the only sure protection against torn fleeces. The barn floor, in preparation for shearing, should be as clean as the house floor, and a platform made of planed plank should set about eighteen inches high, so that the neck of the sheep may rest on the thigh of the shearer, having one foot on the platform. Sheep, to shear well, must have a full stomach, and have a good covering of flesh on their bones. It is no object to take the last ounce of wool, for in the process clips of hide are usually taken, and the animal is exposed to being sunburnt, and will more readily take cold on exposure.

A second platform, built as high as the waist of the folder, is necessary, and this should be smooth, that the wool may be put up neatly and in compact form, exposing the shoulder, the best part of the fleece, "of course." A folding box on which the twine is laid is preferable; by bringing up the sides and ends fastened by hinges, you have compressed fleeces of uniform shape. Prairie wool has a dark color, given to it by the soil and burnt sod, but this does not detract from its value; and if it is a long staple, grown

on a healthy sheep, yielding to the touch and corky, it has a real value which will bring eager purchasers the distance of a long journey.

SECTION VII.—A SHEPHERD'S RULES.

Von Thuer, the great German authority on fine woolled sheep, lays down the following rules for shepherds. So many are exactly applicable to the interests of flock-masters everywhere, that we reproduce them entire, both as a capital study for all flock-masters, and for the added reason that they have not been incorporated into the trade books on sheep.

First. Take good care that your sheep are never brought upon low, wet ground or morasses.

Second. When the localities permit it, there should be a regular change in the pasture lands. For instance, bring your sheep—

(a) In a wet, rainy season or day, upon mountainous or hilly ground.

(b) When the weather is dry and clear, feed them upon flat lands or valleys.

(c) In cold, stormy weather lead them under the cover of forests or bushwood.

(d) In winter, when there is a dry frost, and when the ground is free from snow, you may lead your flocks upon wheat or rye fields.

Third. The pasture lands which are considered the best and nearest ought to be used—

(a) For the ewes with lambs and yearlings, and for such lambs which have been separated from their mothers.

(b) The farthest from the sheep yard for wethers.

(c) The sheep intended to be sold to the butcher upon the lowest pasture lands.

Fourth. Every shepherd must have a good dog to keep the sheep from injuring the crops when they are brought to them.

Fifth. When the sheep are pastured in valleys where there is a heavy dew, and the grass covered with spider-webs and other impurities, they must be driven first over the ground upon which they are pastured. The dog is used to drive them over it in all directions. This is done for the following reasons:

(a) The rain carries down from the mountains or hills sand, which is deposited upon the grass. In passing the sheep over such pasture lands the sand is thrown off and the grass is rendered more suitable to feed sheep upon.

If clay has been deposited upon the grass, the shepherd must not allow his flock to stop at all and feed upon such grass, which would be exceedingly unhealthy for them. He must avoid such places until the clay has become perfectly dry upon the grass, when the sheep are driven over first before they are permitted to touch it.

Great injury may be done to the flocks in such valleys or flats, even if there has been no clay deposited upon the grass. When the sheep are fed upon the luxuriant grass after they have received salt but no water they overload their stomachs and are liable to disease.

(b) A certain species of spiders is to be found among the grass, and sometimes in such quantities that they are eaten by the sheep with the grass. This has not, however, a very bad result, but causes a slight purgation. When the sheep are driven over the ground first the spiders fly to their retreat.

The cobwebs with which the stubble-fields and grass are covered in the autumn seem to have an injurious effect upon the sheep. When a sheep is opened after having fed upon such lands as are covered with cobwebs, there is not a trace of them to be found in their stomachs. Where the sheep are passed over such fields or grass land the cobwebs are taken off by the legs of the sheep.

Sixth. During the mid-day sun the sheep ought to be brought under a shade or shady trees. When the pasture lands are too far from the sheep yard, there ought to be proper shades erected where trees are not in sufficient number to give shelter from the sun, rain and hail.

Seventh. The healthiest pastures should be reserved for the lambs, that the delicate animals, after they have been separated from their dams, may find a substitute for the nourishing milk and not be too much retarded in their growth.

Eighth. In the spring avoid all pastures where there are briars, bushes and woods with short undergrowth, because the sheep will lose their wool in such places. Avoid, also, pine woods, because the pine needles which fall continually from these trees will become entangled in the wool and depreciate its value. After the shearing, such pastures can be used without injury to the sheep and wool.

Ninth. Nothing is so injurious to sheep and wool as a sudden fright. In the night, when they are penned in the open field and there is a storm ap-

proaching, with heavy thunder, the shepherd must walk around the pen and talk to them, in order to quiet them. When they get much frightened they rush to one side of the hurdles, upset it and break loose.

Tenth. In the hot season the shepherd should lead his flock in such directions as to keep the sun behind it, in order that their bodies may give shade to their heads; and he should keep them as far apart as possible, to allow the air a free circulation among them.

Eleventh. Guide your flocks always slowly, especially on rising grounds. Should the shepherd neglect the precaution, particularly in hot weather, the sheep become overheated and are liable to dangerous attacks.

Twelfth. When the sheep are brought upon the stubble-fields observe the following rules:

(a) Bring first the lambs upon it. (b) The ewes, and then (c) The rams and wethers.

Thirteenth. As it is the rule not to bring the flocks upon the pasture in the morning before the air has dried up the dew and frost, it is also a rule to bring them in the stable or pen when the dew begins to appear.

Fourteenth. A shepherd should always carry with him—

(a) A lancet. (b) A sharp knife. (c) A small tin box filled with tar. (d) Another with sulphate of copper.

That in case an accident should happen, he may bleed the animal; or when he observes a sheep to walk lame, and finds the foot heated, indicating a disposition to foot-rot, he may remove the hoof with the knife and apply copperas, over which he has to put a layer of tar.

CHAPTER VI.

SHEARING AND MARKETING WOOL.

SECTION I.—WASHED VS. UNWASHED WOOL.

The question as to the economy of washing wool, or shearing without washing, has for years been widely discussed, but it has generally now been accepted as correct, that it is more profitable to sell the wool unwashed. This will hold good in all those sections not so distant from market that, on account of the increased cost of transporting unwashed wool, it is cheaper to wash. It is generally accepted that the farmer receives more money for his fleeces un-

washed than washed. The reason is, however well the wool is washed, it must be scoured at the mill to fit it for spinning, and it costs no more to scour the wool as it comes naturally from the sheep's back, than after it has been washed by the ordinary processes at home.

In all the great plains region—in Texas, New Mexico and California, where washing is necessary on account of transportation charges, the wool should be most thoroughly washed, and probably if the wool were scoured at some central point, before shipping as is practiced at the mills, it would prove the most advantageous. The question is an important one, but one that must be decided by each flock-master for himself. The washing of wool is explained in the preceding chapter.

The manner of washing must depend on the facilities. If there is a head, so the water may be brought in a pipe or hose, this is the best possible manner of washing, since the flow tends to separate the dirt. The washing in any case, consists in squeezing the wool until all the impurities soluble in water are carried away.

If the sheep are to be washed in a running stream, a gravelly bottom must be selected. The sheep are forced into the water from a pen as wanted, and when free of dirt, are let out on a firm sward, and kept thereafter on clean pasture until quite dry, and until the secretions again appear—say from ten days to three weeks, as the case may warrant.

SECTION II.—SHEARING.

Shearing is an art that must be learned—the manner of holding the sheep so the shears may be used with the best effect. The position of the shears upon the skin to enable the operator to shear fast, evenly, and without injuring the skin is also of importance.

In shearing, the sheep is placed upon the rump, and the shearer, beginning at the neck, clips in a circular direction down the belly toward the back. The animal is then laid on his side, and kept down by the leg of the shearer, who clips the fleece all round to the back. Turning the animal on the other side, he clips in like manner, round to the back; then raising the sheep, he clips the part of the fleece not yet cut away, and so lets the animal go, taking care that it shall not entangle itself with the fleece. It is impossible to state intelligently just how the shearing is performed. A little instruction from a

competent person as to the manner of holding the sheep, the manner of making the strokes with the shears, and of keeping the fleece from tangling in the operation, will soon be acquired. Thenceforward, practice alone will make a fast shearer.

SECTION III.—SORTING AND TYING WOOL.

In the sorting of wool, when each kind is to be placed separately, much judgment is required. In the United States this is only done at the mills, and by an expert.

In Spain, it is the custom to sweat the sheep the night before shearing, by keeping as large a number as can be crowded together in a hut. The wool is removed the next day without being washed, that operation being conducted afterward. The wool is first sorted into three parcels; in some places these parcels contain the different qualities.

1st, superfine picklock (*refina*), taken from the back, flanks, and sides of the neck.

2d, fine (*fin*), from the breast, belly, sides of the haunches, and upper part of the neck.

3d, third kind (*tercera*), from the cheeks, upper part of the throat, the fore-legs above the knee, the hams, and back of the haunches.

4th, fourth quality, or *cayda*, is refuse, and is from the tail, rump, lower parts of the legs, and between the legs.

The assorted parcels are thence treated separately; first, they are beaten on hurdles; then placed in vats containing water heated to 120 degrees Fahrenheit, where they are stirred with sticks; then removed to drain, and transferred to a running stream; here the wool is pressed by the feet of the workmen, and finally thrown out on the grass to dry. In a few days of hot, dry weather it becomes sufficiently dry to pack.

We give this plan for the reason that on the plains and in other territory far from market it may prove advantageous, where large flocks are kept.

TYING THE FLEECES.

The ordinary manner of tying the fleeces is as follows, when frames for tying are not prepared:

With each fleece the loose locks are taken, but the hair of the legs separated and placed in a bag or elsewhere. The fleece is carefully spread out on the table; the ragged portions on the edges are separated, and, with all the loose wool, thrown into the middle. The workman next presses the sides inward, so as to condense the wool; the sides and ends

are then turned over, so that the folded fleece forms an oblong two or three feet long and one and a half feet wide; this is drawn to the front edge of the table and rolled, during which the assistance of a boy is necessary to press the wool together and condense it. The roll is finally tied with a stout twine.

SECTION IV.—STORING AND BALING.

In storing, the fleeces should be piled regularly in a loft, and as compactly as possible, binding the whole together as in laying bricks. When ready to be packed, the sacks may be made of burlaps, a piece a yard wide and three yards long making a bale. The top of the bag is kept extended by a hoop even with the floor, the sack being let down below. A man enters the sack and packs the bales regularly as they are handed to him, tramping the whole as solid as possible as he proceeds, until the sack is full, when the top edges are brought together and strongly sewed.

SECTION V.—MARKETING WOOL.

In this connection there are so many things to consider that we advise the wool to be sold at the wool barn, if possible, the buyer attending to the packing. Wool certainly looks better carefully ricked than after being packed in sacks. There is a far better chance for a thorough examination. Another advantage is, if the price offered is not satisfactory, the wool remains intact. Hence, if you have not a proper place to keep wool, make one. A tight apartment in which water or dust cannot enter, is absolutely necessary for the preservation of the fleeces.

Wool is a safe property to keep, if insured. It gets better rather than poorer. The only thing to be considered is that the holder must keep posted on prices, and whenever sold, the owner should be a sufficiently good judge of a fleece to be able to combat any special plea of the buyer, as to quality, evenness of fiber and cleanliness.

CHAPTER VIII.

ANATOMY AND PHYSIOLOGY OF SHEEP.

SECTION I.—THE BONY STRUCTURE.

The anatomy and physiology of sheep is not especially necessary to be entered into here, since the general rules as applied to cattle will suffice. The bony structure is identical, including the parted hoof and the arrangement of the teeth. One of the

peculiarities of sheep, however, is that their horns are various, curved, spiral, and even there are sheep of more than two horns. Like the ox, the sheep has horns springing from the frontal bone; the frontal sinuses are large and open; the skull bones wide and extended, the orbits are more lateral than central, and the facial angle is about thirty degrees.

SECTION II.—PHYSIOLOGY OF THE SHEEP.

The sheep, like the ox, is a ruminant, and is provided with four stomachs. The whole visceral and soft parts are but little dissimilar, except in proportions. The economy of rumination is identical. The covering of the animal, however, is different. The ox has hair, the sheep has wool. What constitutes this difference is, that it is crimped, and has serrated edges, causing it to possess the valuable quality of felting, and, as a rule, those qualities of wool most closely crimped possess the best felting qualities. Notwithstanding that sheep are clothed with wool, some breeds, and all wild sheep, possess hair also, but in the better breeds it has been bred almost completely away.

THE SKIN OF SHEEP.

The skin of sheep is composed of three textures: The cuticle, outer skin. This is thin, tough, insensible, and pierced with numerous orifices for the passage of the insensible perspiration and the wool fibers. This cuticle appears to be of a scaly texture. Below the cutis is another structure, the *rete mucosum*, of but little consistency, and with difficulty separated from the under, or true skin. This true skin is composed of innumerable minute fibers, crossing each other in every direction, is exceeding elastic, fitting closely to the body, and perfectly yielding to every motion of the body. Above the outer skin is a layer of what is termed the yolk, a substance which will saponify with water. In fact, it is a kind of soap. It differs in quality in different breeds, but is found most abundant about the breast and shoulders, but in Spanish and American Merinos pervades the whole body, and in proportion to the abundance of this yolk, are merinos held in repute by their breeders. The fiber of the wool having penetrated the skin and escaped from the yolk, is of a circular form, generally larger toward the extremity and also toward the root, and in some instances very considerably so. When the animal is in good condition, and the fleece healthy, the appearance of the fiber is brilliant, but

when the state of the constitution is bad the fiber has a dull appearance, and either a wan, pale light, or sometimes scarcely any, is reflected.

SECTION III.—THE TEETH OF SHEEP.

The dentition of sheep is as follows: There are eight incisors in the lower jaw, and none in the upper. The molars, or grinders, are six on a side, making twelve grinders in the lower jaw, and twelve in the upper jaw, making in all thirty-two teeth.

THE AGE OF SHEEP AND THE TEETH.

At birth, the lamb should have the two central incisors just pushing through. At a month old all the incisors should be visible. When they are about one year and a half old, they shed the two center teeth of the incisors, and two wide ones take their place. The next year the next two are shed, and when the sheep is three years old, the four central teeth are fully grown. At four years they have six teeth, and at five years the teeth are perfectly developed. This is one year before the horse or ox can be properly said to be fully mouthed. This rule for the age of sheep will hardly ever fail in ewes, but sometimes will in the case of rams. If not too old, the age may be determined by the growth of their horns each year. The difference caused in the shedding of their teeth may be by the manner in which the sheep are cared for. If well fed and kept in a thriving condition, they will shed them sooner, if ill-kept, later. Some sheep with the permanent teeth will hold them much longer than others. The natural age of sheep is about ten years, to which time they will thrive and breed well if in good health.

CHAPTER VIII.

PARASITES AND DISEASES OF SHEEP.

SECTION I.—EXTERNAL PARASITES.

There are many parasites of sheep, but the most serious is scab, mange or itch, as it is variously called. Not that it is difficult to cure; it is not; but so persistent of life is the insect that causes the disease that once it infests a flock, pastures and every surface that the sheep has rubbed against carries the contagion, and its vitality is so great that it may remain for months.

SCAB OR MANGE.

There are three different forms of scab infecting sheep caused by parasitic mites, which infest the

skin, causing great itching, the discharge of watery fluid, and the formation of scabs, and loss of wool which carries the infection. The scab insect most prevalent in the United States is called *Demodectes oris*.

If the skin of a sheep affected with scabs is examined with a lens, the insect may be found. Upon



Appearance of Sheep with Scab.

the skin will be small, reddish pimples, upon the surface of which will be a blister. The wool becomes ragged, and if allowed to continue the wool falls out, leaving bare patches, and the sheep becomes a most loathsome object.

REMEDIES.

There are many remedies. A preparation, probably the most effective, but poisonous, and one, which if used, the sheep must not be turned on a pasture, since if the infected grass be eaten, the animals will be poisoned, is made as follows;

ARSENIC SHEEP DIP.

Take of arsenic, sulphur, soda ash and soft soap, of each three pounds. Mix in ten gallons of boiling water, and when stirred until quite dissolved, add ninety gallons of cold water for use.

TOBACCO DIP.

Tobacco, however, is effectual and not poisonous to pastures. To prepare a tobacco dip, take ten pounds of tobacco, also soft soap, sulphur and soda ash, of each three pounds. Steep the tobacco in thirty gallons of boiling water, until the strength is exhausted. Skim out the tobacco, squeeze dry, and add the other ingredients, stirring until thoroughly mixed. Then add eighty gallons of cold water to form the dip.

SULPHURIZED TOBACCO DIP.

The usual dip, however, is made by boiling one pound of tobacco leaves to each five gallons of water used, until the strength is exhausted. Then, when strained, add one pound of sulphur to each five gallons of water.

This solution is used as hot as may borne by the sheep. About four or five minutes is the time required for the sheep to be immersed, the idea being to fully saturate the skin and wool. The head is also to be occasionally thrust into the dip, but care must be taken not to cause strangulation.

COLORLESS SHEEP DIP.

A dip that will not stain the wool is made by mixing ten pounds of sulphate of zinc, and two pounds of arsenic in sixty gallons of water, boiling down to fifty gallons, and then adding ten gallons of cold water to bring it up again to sixty gallons. We, however, advise the use of either of the tobacco dips; they may make the sheep sick for a time, but it is not poisonous to pastures.

TICKS, LICE, ETC.

Many good shepherds make a practice of dipping the lambs when about four weeks old in the tobacco dip, when infested with ticks. The ticks are usually found on the sheep, but in suckling they leave the old sheep and the lambs are infested. The sheep are also dipped after shearing.

SECTION II.—INTERNAL PARASITIC DISEASES.

Internal parasites are common to sheep, and some of them, especially those of the brain and liver, may prove fatal. The most common of parasites, however, is the grub of the sinuses of the nostrils, usually denominated

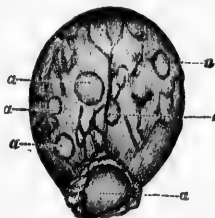
GRUB IN THE HEAD.

This is the larvæ of the sheep gad fly (*Estrus oris*), the eggs of the fly being deposited in the nostril of the sheep in July and August. The maggots, when hatched, make their way to the sinuses, where they attach themselves by their hooks, causing much distress. The cure is difficult except by a surgical operation. Injecting equal parts of sweet oil and turpentine well up the nostrils will sometimes make the grubs let go from the sneezing of the sheep, but care must be taken against strangulation.

The preventive is in plowing furrows in the pasture and thoroughly pulverizing them with the harrow. The sheep will lie along these with their noses in the dust during the season of the fly. Smearing their noses with tar is also good.

Hydatids, or blabs, are parasitic, generally pear-shaped, like a bladder full of water, and cause diseases of the brain, such as sturdy, dizzy or staggers.

The symptoms of diseased liver are plain in these affections, and they run round and round, eventually becoming blind, emaciated, exhausted; and we do not believe it worth while to attempt to cure such a sheep, but trepanning, by a surgeon, and removing the hydatids might save it.



Brain of the Sheep with Tape Worm Cysts. a, a, a, Cysts.

ERYSIPELAS.

Erysipelas has been termed a "skin disease," by veterinary surgeons, but we believe it to be a blood disease—that the blood is very much

vitiated, often, before any external manifestations, which is by biting and rubbing the affected part when a watery humor exudes and causes the disease to spread rapidly. A strong solution of sal ammoniac, applied externally, and using sulphur and cream of tartar plentifully in the sheep's food, is the best remedy, so far as I know.

LIVER-ROT.

Liver-rot is a constitutional disease, and is manifested, as described above, under the head of "diseased liver," with the additional symptom of presence of fluke-worms (*Distoma hepaticum*) in great numbers, in the liver especially. We believe this disease is sometimes induced by keeping sheep on wet or marshy pastures, and that the lambs or ewes so affected will have this diathetic taint. But whether the fluke-worm has been found in the stomach of the sheep, or on the grass, or water, or herbage, where such animals had not been previously grazing, with us is a question of importance. We think that the diseased liver is not caused by the fluke-worm, yet we do believe that the fluke-worm is propagated in the diseased liver, but how they got into the liver to commence propagation is as far beyond our comprehension as are the facts that worms have been found in the kidneys, liver, eye, lungs, brain, etc., of the human animal; or that five different kinds of worms are frequently found in the human stomach and bowels. We think that similar worms are found in swine, and we know that hogs which had been used to drinking soap-suds were entirely free from worms of any kind. We know that the tape-worm has been found in many other

than the human animal. And the (*tricocephalus dispar*) or long thread-worm, the (*Oxyuris vermicularis*) maw, or thread-worm, usually called *ascarides*, and the (*Ascaris lumbricoides*) or large, round worm, are so nearly like some of those described by others, and those we ourselves have seen in both sheep and hogs, that we are inclined to the opinion that they are propagated in a similar way in the different animals, but to tell how it is done we fully confess we can not.



Cyst from Brain of Sheep.

We believe that strong wood ashes used freely in the food will not only prevent their propagation, but also tend to destroy those already propagated. Common salt with the ashes has been regarded as a cure for liver-rot.

THE SCREW WORM.

Although not troubling the sheep in this region to our knowledge, having received information in regard to this pest from a gentleman who has had experience with it in Texas, it may not be amiss to publish his statement as corroborated by the press: "This worm is a great pest to man and beast in Texas, and especially to sheep. It, like the maggot and grub in the sheep's head, is the offspring of a fly, which deposits the larvæ, or eggs, on any part of the body, or thing, where they can find blood, of which they seem to be very fond, and as soon as the chrysalis or shell is burst, or the worm is hatched, it begins its work of destruction by boring into the skin or body; that if in shearing the sheep any clip of the shears brought blood, the blood had to be covered with tar, or the sheep would be killed in a few days by these worms. Hogs, cattle, mules, and horses are all treated to a dose of good pine tar as soon as possible after blood be drawn by any means. The trouble is gradually becoming worse and worse every year, and most likely that fine grazing region will necessarily be abandoned as a herding place for either cattle or sheep, yet it is possible that both cattle and sheep may be kept in small flocks, so that each animal in the flock may be closely observed each day during the season in which there is greatest danger."

Man is sometimes attacked. In one case in man the only known remedy was applied—calomel and

carbolic acid by injection into the nostrils. At first a few would drop their hold and force themselves out. Application after application was made until 152 was the number passed. The fly is much dreaded by stockmen, and is represented as a dark-colored and fuzzy insect, which attacks cattle or any other animal that is unfortunate enough to have blood upon which they can alight. Doubtless this fly belongs to the same genus as the *Estrus bovis*, or gad fly, which deposits its larvæ on the backs of cattle, from which what are commonly called warbles are hatched, and, also, the fly from which the common maggot, the grub in the sheep's head, and the bot in the horse's stomach, are each the progeny of different species of the same genus. Application of pine tar to the nose of the sheep is a preventive of destruction by the grub by keeping the fly away.

PAPER SKIN.

The disease called paper skin, says Mr. Hogg ("Ettrick Shepherd"), is a strange one, it may affect a whole flock at once. The first symptom to the practiced eye is lassitude of motion and a heaviness about the eye indicating feeble action, and when dead there is found but little blood in the carcass, and even the ventricles of the heart become as dry and as pale as its skin. As the disease proceeds the hair of the animal's face becomes dry, the wool assumes a bluish cast, and if the shepherd has not the means of changing the pasture, all those affected will fall in the course of a month.

WORMS.

Mr. Spooner, under the heading of "Worms," says: "Mr. Copman, of Suffolk (England), found fifty lambs laboring under diarrhœa. On examining some which died, he found large patches of inflammation on the villous membrane of the fourth stomach. The small intestines contained thousands of tape-worms (*Tenia plicata*), and about twenty-five of the large round worms (*Ascarus lumbricoides*), with a large quantity of sand." A practical writer holds the opinion that the afflictions of the flocks thus described, and that modern disease called paper skin, is one and the same, in different degrees of virulence, and the remedy is change to high, dry pasture, with plenty of good, clear water, and a plentiful use of wood or cob ashes, with salt in oats and bran, and we regard this prescription as a preventive of paper skin caused by worms, yet anemia

or a lack of blood may result from other causes than worms, which we will not attempt to describe here.

SECTION III.—CONTAGIOUS DISEASES—FOOT-ROT.

Scald, as it is called, is only the first visible symptom of foot-rot. This disease is regarded by some persons as being hereditary; but this theory is controverted by the fact that a cure can be effected by application of remedies to the feet alone. Others think it contagious; that if a sound sheep should inhale the breath of one that has the foot-rot, the sound sheep would be instantly tainted, and its feet would become sore from that cause. It is contagious by means of the virus, or poisonous matter from sore feet, coming in contact with others, and yet we know that some sheep have remained sound for years while kept in the same flock with others, some of which at times were very sore. Sheep are not predisposed to foot-rot. We believe the disease is usually confined to the feet, except when maggots, hatched in the feet, crawl from them to the body while the sheep is lying down.

Although we regard it as contagious, yet we also regard it as a production from tall grass on marshy or wet pasture, when the sheep's feet are almost constantly wet, having no dry or dusty stamping ground; while they are perhaps fed on corn, which, with the other causes, tends to produce the disease; which is manifested by a scalded-like appearance of feet, when the sheep begins to limp or move stiffly. The foot is feverish, having a watery exudation from the junction of the flesh and hoof in the cleft (what some designate as scald). Then the heels are apt to become still more feverish, and the watery exudation increases in quantity as well as in virulence, until it results in a discharge of pussy matter from cracks between the horn of the hoof and the fleshy part of the foot. This discharge continues, and the process of separation continues in its natural course until the entire hoof is ready to drop off. And often when sheep have been affected with it for a long time, the heels will become much enlarged by matter humors. In all the various stages of this disease, from the scald to the dropping off of the hoof, during the summer season the maggots are liable to assist the disease in the destruction of the sheep, and yet a cure is most easily effected just after they have cleaned out the purulent matter and decayed hoof.

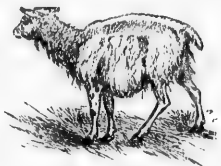
TREATMENT.

To cure, the part of the hoof separated from the

fleshy part of the foot should be cut away, drawing as little blood as possible; cleanse the sore, and apply to it a small quantity of a mixture of red lead (dioxide of lead) and blue vitriol (sulphate of copper), pulverized, in equal quantities by weight, adding enough nitric acid to the powders to make the consistency of thick paint when mixed; and ordinarily three applications within two weeks will banish the disease without even changing the sheep to new pasture. The sheep should be kept dry—from rain or dew—for at least twenty-four hours after being doctored.

SHEEP ROT.

Sheep rot is caused by a liver fluke, or rather two species of them. The loins will be tender, the body swollen, the eyes yellow from inaction of the liver, and if the skin be taken up between the thumb and fingers and rubbed, it will be found soft and flabby. Remove the sheep at once to a high and dry pasture



Sheep Rot.

—the disease is contracted on low, wet lands. The first thing to do is to regulate the bowels, and alter the secretions. The following may be given:

Sulphate of magnesia, two ounces; water, one half pint; mix

these together in a bottle, and then add oil of turpentine, two drachms; shake until well mixed, and give this dose every other day until two doses are given, always shaking well before administering.

Dr. Clater says he has had great success with the following, and we append his prescription in full. If used, the foregoing should not be administered. The prescription and directions are as follows:

Take of Nitre, in powder,	6 oz.
Ginger, fresh powdered,	4 "
Colethar of Vitriol, in fine powder,	2 "
Common salt,	3½ lbs.
Boiling water,	3 gals.

Pour the water hot upon the ingredients; stir them, and when new-milk-warm, add to every quart of the mixture three ounces of spirit of turpentine, and bottle it for use.

If this medicine be put into bottles holding from one to two quarts of the mixture, it will be much the better, as the bottles will be more convenient for shaking at the time of giving, which will be found

necessary in order to keep the turpentine in a more divided state.

The following directions must be strictly regarded: *Keep the infected sheep from food all night: on the following morning give to each sheep two ounces or four tablespoonfuls of the above mixture. (Remember to shake the bottle well at the moment of pouring it out.) To those which are weak and much reduced by the disease, one-half, or three parts out of four, may be sufficient for a dose. Keep them from food three hours after giving the medicine, and then turn them into a dry pasture.*

It will be necessary to repeat the medicine every fourth day for three times, observing the above rules. But where only half the quantity has been administered it will be proper to repeat it every second or third day for six times. Every shepherd should be provided with a small horn, containing just the proper quantity; this will save considerable time and trouble, when it is necessary to give the above drink to a number at the same time.

SHEEP DISTEMPER.—EPIZOOTIC CATARRH.

The chief reliance in this disease is good nursing; keep the sheep warm. Probably a good treatment is that recommended by Col. Randall, repeated doses in which corrosive sublimate is combined with stimulants and tonics. Take

Corrosive Sublimate,	8 grains.
Rhubarb,	1 ounce.
Ginger,	2 ounces.
Gentian,	2 "

Simmer the gentian, ginger and rhubarb, in a quart of water for a quarter of an hour, strain, and add the sublimate. Give as a dose two tablespoonfuls twice a day.

SECTION IV.—COMMON DISEASES OF SHEEP.

If milk fever attacks the ewe, separate her from the flock and give the following:

Sulphate of Magnesia,	2 ounces.
Saltpetre,	1 drachm.
Molasses,	3 ounces.

Give this in a pint of linseed tea, and if it does not move the bowels in ten hours, repeat. Then continue the use of the saltpetre and molasses, without the use of the magnesia, so long as fever lasts.

GARGET IN EWES.

The symptoms of garget, or enlargement of the udder with heat and tenderness, must be promptly met. The udder must be thoroughly fomented with hot water, and a sheepskin dipped in hot water ap-

plied. If the case is mild give internally, as a laxative, mixed in gruel—

Sulphate of Magnesia,	3 ounces.
Flowers of Sulphur,	1 ounce.

Mix in a pint of linseed tea. Keep the teats drawn as often as possible. If the trouble is more severe, give the following—

Sulphate of Magnesia,	4 ounces.
Powdered Ginger,	1 ounce.
Oil of Turpentine,	$\frac{1}{2}$ "

CONSTIPATION IN LAMBS.

Inject the following: three tablespoonfuls of melted lard; or, as a substitute, one tablespoonful of castor oil. This may be given with a common syringe, holding the lamb up so that its fore feet just touch the ground during the operation. If the lamb continues drooping after an operation of the bowels, give three or four spoonfuls of strong bone-set tea.

DIARRHŒA.

This is sometimes very fatal, since it often takes an epidemic form. It is due chiefly to exposure and improper diet. Prevention is better than cure, by removing the predisposing cause. At all events once diarrhœa is fairly established, it is often difficult to cure. The lambs should have a warm, well-ventilated stable. If the attack is slight, give—

Prepared Chalk,	2 ounces.
Ginger,	$\frac{1}{2}$ ounce.
Opium, powdered,	1 drachm.

Mix this in a pint of peppermint tea, and give a tablespoonful night and morning until the bowels are regular. If the case is very severe, add to the above one ounce of powdered catechu, and administer as directed.

RHEUMATISM OR PALSY.

This is not a common disease, but yet is sometimes found, and especially in weak lambs. The preventive is good quarters and good feeding for the ewes.

As a laxative and stimulant, take of

Sulphate of Magnesia,	2 ounces.
Powdered Ginger,	$\frac{1}{2}$ ounce.

Mix in half a pint of thin, warm gruel, and give a wine-glassful until the bowels are regular. In ordinary cases, a strong decoction of willow bark,

sweetened with molasses, and given in tablespoonful doses, and often repeated, has been found effective. If the limbs and joints are swollen, apply only soothing liniments, never stimulating ones. A liniment of oil and laudanum would be indicated. Take

Sweet Oil,	1 pint,
Laudanum,	2 ounces.

Mix and apply.

Attention must be given to comfort, and the animals must not be exposed to cold or storms of rain.

BRAXY.

This is a blood disease of sheep. The animal will be excited and staggering in the gait; the eyes will be bloodshot, pulse rapid and full; respiration quick, mouth, limbs and body hot, and the urine scanty and high colored.

There are two forms, one with diarrhœa, and one with constipated bowels. These must be met with astringent or laxative remedies as the case may be. If constipation be present, give four to six ounces of Epsom salts, to which is added one-fourth ounces each of powdered gentian and ginger. Administer in half-a-pint of warm gruel.



The Facial Vein in Sheep.

Bleed at once from the facial vein. This may be raised by pressing the vein at the lower jaw, unless the jugular vein in the neck can easily be found.

APOPLEXY AND INFLAMMATION OF THE BRAIN.

Fat and plethoric sheep are often subject to apoplexy, and, as a secondary result, inflammation of the brain. The sheep will leap suddenly into the air and then fall. Death will ensue in a few minutes unless relief is given; sudden and copious bleeding from the jugular vein is the first means. Then give two ounces of Epsom salts in a gill of water, and follow every six hours with half the quantity, until thorough evacuation of the bowels takes place. Sheep subject to apoplexy should be immediately sold, when in good condition.

Swine and Swine Breeding.

CHAPTER I.

ORIGIN, HISTORY AND CHARACTERISTICS OF IMPROVED BREEDS.

SECTION I.—NATIVE COUNTRY OF SWINE.

The period of the first domestication of swine is not known. Their native country is not known; yet they have been known from the time of the remotest antiquity, wild, in Europe, Asia, and Africa. In America, in Australia, and in the Pacific islands, swine were unknown until introduced by Europeans. The fact that swine, in a wild state, are able to cope with the carnivorous beasts of the forests less in size than the leopard; their great fecundity, and their means of providing food in forest regions, even in very high latitudes, accounts for their wide distribution. In the United States, they soon escaped into wildness after their first introduction. Even now in some portions of the South, they run wild and are dangerous to intruders. Even in Cook County, Ill., and within twenty miles of Chicago, the writer has hunted wild hogs, a legacy of the Indians. Their beds in the timber skirting the Calumet river were not seldom seen, and the alluvial bottoms of that river furnished their rooting grounds, and the mast their winter food. The hard winter and deep snow of 1844 destroyed the last vestige of them, they being found dead the succeeding spring in their breeding places.

ALL SWINE PROLIFIC WITH EACH OTHER.

All our domestic breeds of swine have a common origin in the wild hog of Europe, Asia and Africa, and all wild hogs must have had a common origin. Domestic breeds, which must have been made up on foundations of the domestic hog of Europe, Asia and Africa, are markedly distinct, but belonging to the same species, (*sus scrofa*); yet they are prolific with the wild hog of the three continents; not only

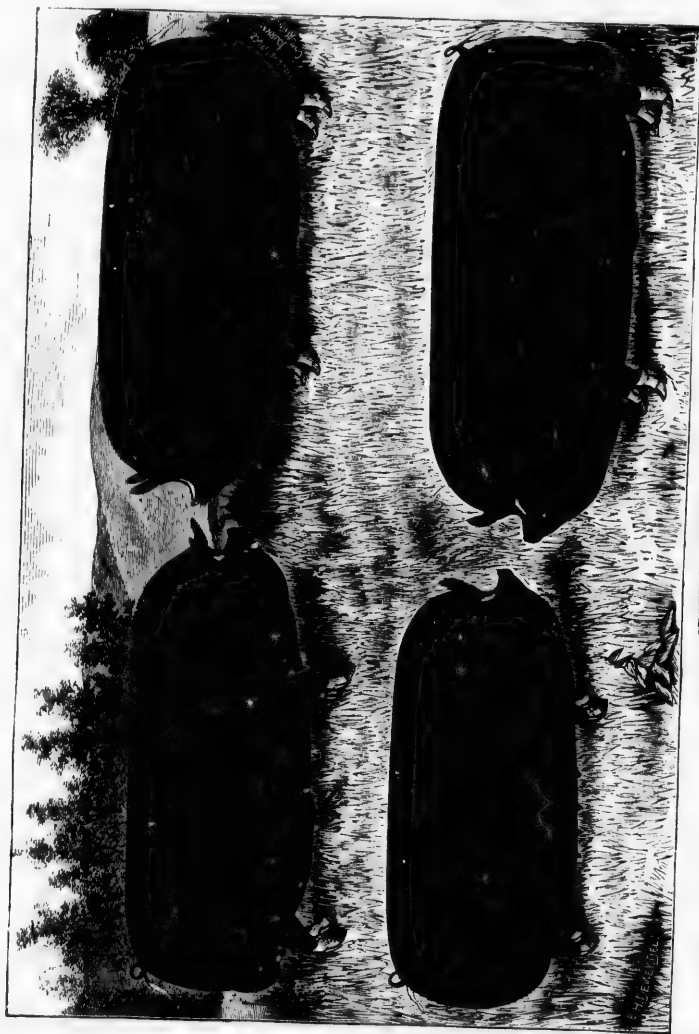
this, their descendants continue so from generation to generation, which is not the case with hybrids.

While all swine of the great continents named have contributed to the improvement of modern breeds of swine, the greatest improvement has come from the Chinese hog, giving aptitude to fatten and a quiet disposition; and from the Neapolitan, itself originally, in all probability, an African race, imported in an early age and bred to perfection in the genial clime of Italy. Later came the Indian or Siamese hog, holding the same relation to the Neapolitan hog, the improver of all the black breeds, that the Chinese hog does to the breeds of swine generally.

The Siamese hog is the modern representative of the old Indian blood. Our favorite breeds are mostly of English or Irish origin, although the Poland (Russian?) hog is said to be an integer in one of the most favorite of Western breeds. Here again, however, the Neapolitan or modified Indian hog is the improver of the Polish swine. The crosses, selections and careful breeding, for nearly a century, in Great Britain, and for nearly the same length of time since the careful breeding of swine was established in America, has resulted in breeds that have no superiors on earth. Aptitude to fatten has been imparted by crosses of the Chinese, and style, beauty and delicacy of flesh by the Neapolitan or modified Siamese, or, as it may be more properly called, hog of India.

SECTION II.—ENGLISH BREEDS.

The principal breeds of English swine as originally established, were in Berkshire, Essex, Hampshire and Yorkshire, according to the authority of Martin, and to which on the authority of Youatt may be added the swine of Wiltshire. None of these breeds, except perhaps in some possible crosses, are valuable now except the Berkshire and Essex among the black breeds, and the three classes of the Yorkshire, the small, the medium and the large Yorkshire; and the short-faced Lancashire, and the large Lancashire.



GROUP OF BERKSHIRE SWINE.

These hold the same relative position among the white breeds of England for high breeding, that the Berkshire and Essex do to the black breeds.

BLACK DORSET.

Among the large black hogs of England, the Black Dorset are celebrated for strong constitutions, kindly pattering qualities and heavy weights. They are little if at all known pure in America. It is not improbable that they may have been used as a modifier in some of our large black breed, and perhaps owe their origin to the integer known as Poland, in one of our favorite Western breeds, now often bred black, except occasional body marks, as is the Berkshire, except as shown in the regularly marked white face and white fetlocks. The Berkshire is the highest representative of the medium sized black breeds, the Essex holding similar rank as the highest representative of the small black swine.

SECTION III.—ENGLISH AND AMERICAN MODIFICATIONS.

The English Suffolk is simply a modification or variety of the Yorkshire. The Culehill, the Manchester, Middlesex, Suffolk and Windsor are undoubtedly modifications of the Yorkshire breed, built up on Yorkshire-Cumberland stock, and really without marked distinctions. Our Cheshire are finely bred and modified Yorkshire swine, and given to heavy weights. The Victoria hog of New York is a modified Yorkshire, of the middle breed. They take fat easily, assimilate promptly and their flesh is delicate like their constitutions. The Western Victoria, however, is a hog of medium weight going up to 400 or 500 pounds, and stronger in constitution than the Victoria of New York State.

SECTION IV.—DISTINCTIVE AMERICAN BREEDS.

Of the valuable breeds distinctively of American origin, the Poland China among the black, and the Chester White among the white breeds, have been most widely disseminated in the great corn zone and stock-feeding region of the West, embracing all that portion of the Mississippi Valley lying between latitude forty-four degrees north, down to latitude thirty-five degrees, and extending from the Allegheny slope westward until the arid region of the great plains is reached.

The Jersey Red and Duroc, now united under the name of the Duroc-Jersey, a large, red breed, has lately grown into favor, displacing in some measure the coarser variety of the Chester White in the more

northern districts. The origin of the Duroc lies, undoubtedly, in the Berkshire of forty-five years ago, as we then knew them—a sandy hog, with more or less black. The Jersey Red originated in New Jersey, the Duroc in New York, the Poland China in Ohio, and the Chester White in Pennsylvania. The Cheshire and the Victoria of New York originated in that State, and the Victoria of the West originated in Indiana.

SECTION V.—CLASSIFICATION AND JUDGMENT OF SWINE.

The National Swine Breeders' Convention at its Indianapolis session, November 20, 1870, appointed a select committee to determine a scale of points, perfection representing 100 points, reported the following scale:

1. Back, 10; 2. Long-ribs, 8; 3. Short-ribs, 7; 4. Shoulders, 8; 5. Ham, 12; 6. Length of body, 6; 7. Flank, 6; 8. Twist, 6; 9. Snout, 4; 10. Jaw, 8; 11. Face, 8; 12. Ear, 2; 13. Neck, 4; 14. Belly, 4; 15. Skin, 5; 16. Hair, 3; 17. Bone, 8; 18. Legs, 8; 19. Feet, 2; 20. Tail, 1.

THOROUGHBRED SWINE.

On the subject of thoroughbred swine the committee report that only such breeds as are recognized in authentic history as of sufficiently remote origin, when bred in a direct line, to result in the establishment of a fixed type, capable of reproducing them, selves with uniformity, should be regarded as thoroughbreds.

CLASSIFICATION AT FAIRS.

On the classification of breeds of swine at county and State fairs, the committee recommend the adoption of the following: Class 1, Berkshires; Class 2, Poland China; Class 3, large white breeds, to include Chester White, Large Yorkshire, Large Lancashire, Cheshire, or Jefferson County, and other similar breeds; Class 4, small, white breeds, to include Suffolks, small Lancashire, small Yorkshire, and other similar swine; Class 5, small, black breeds, Essex and Neapolitan; Class 6, cross breeds, and all not eligible in other classes.

SECTION VI.—CHARACTERISTICS OF OUR ENGLISH BREEDS.

From elaborate reports of the several special committees appointed in reference to these breeds, we give the following condensation as authoritative:

BERKSHIRES.

Color, black, with white on feet, face, tip of tail, and an occasional splash of white on the arm; while

a small spot of white on some other part of the body does not argue an impurity of blood, yet it is to be discouraged to the end that uniformity of color may be attained by breeders; white upon one ear, or a bronze or copper spot on some part of the body argues no impurity, but rather a re-appearance of original colors. Markings of white other than those named above are suspicious, and a pig so marked should be rejected.

Face, short, fine, and well dished; broad between the eyes. Ears generally almost erect, but sometimes inclining forward with advancing age; small, thin, soft, and showing veins. Jowl full. Neck short and thick. Shoulders short from neck to middling deep from back down. Back broad and straight, or a very little arched. Ribs—long ribs well sprung, giving rotundity of body; short ribs of good length, giving breadth and levelness of loins. Hips, good length from point of hip to rump. Hams, thick, round, and deep, holding their thickness well back and down to the hocks. Tail, fine and small, set on high up. Legs, short and fine, but straight and very strong, with hoofs erect, legs set wide apart. Size, medium. Length, medium; extremes are to be avoided. Bone, fine and compact. Offal, very light. Hair, fine and soft; no bristles. Skin, pliable. The Berkshires are hardy, prolific, and excellent nurses; their meat is of a superior quality, with fat and lean well mixed.

NEAPOLITAN SWINE.

Head, small; front head, bony and flat; face, slightly dishing; snout, rather long and very slender; ears, small, thin, standing outward and forward, nearly horizontally, and quite lively; jowls, very full but not large; neck, short, broad, and heavy above, with small dewlap; trunk, long, cylindrical, well-ribbed back; back, flat, and ribs well arching even in very low flesh; belly, horizontal on lower line; hind-quarters higher than fore, but not very much so; legs, very fine, the bones and joints being smaller than those of any other breed; hams and shoulders, well developed and meaty; tail fine, curled, flat at extremity, with hairs on each side; general color, slaty or bluish plum color; that is, dark blue, with a cast of coppery red; skin, soft and fine, nearly free from hair, which, when found upon the sides of the head and behind the fore-legs, is black and soft and rather long; flesh, to the feel, fine and elastic.

DISQUALIFICATIONS.

1.—Any color except uniform black, slate color,

plum color, or coppery slate, more or less dark. 2. A coat of coarse hair. 3. Any evidence of impurity of blood or a cross. 4. Any deformity or malformation.

SUFFOLK BREED.

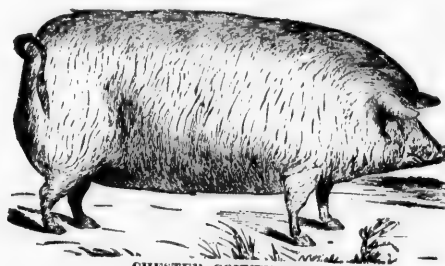
Head, small, very short; cheeks, prominent and full; face, dished; snout, small and very short; jowl, fine; ears, short, small, thin, upright, soft and silky; neck, very short and thick, the head appearing almost as if set on front of shoulders; no arching of crest; chest, wide and deep—elbows standing out; brisket, wide, but not deep; shoulders, thick, rather upright, rounding outward from top to elbow; crops, wide and full; sides and flanks—long ribs, well-arched out from back, good length between; shoulders and hams, flank well-filled out, and coming well down at ham; back, broad, level and straight from crest to tail; no falling off or down at tail; hams, wide, and full all the way down; legs, small and very short, standing wide apart, in sows just keeping belly from the ground; bone, fine; feet, small, hoofs rather spreading; tail, small, long and tapering; skin, thin, of a pinkish shade, free from color; hair, fine and silky, not too thick; color of hair, pale yellowish white, perfectly free from any spots or other color; size, small to medium.

ESSEX BREED.

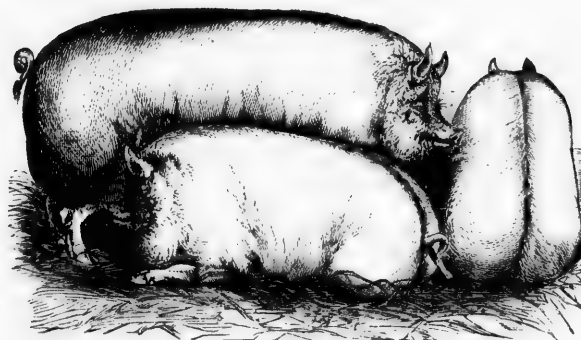
Color, black; face, short and dishing; ears, small, soft, and stand erect while young, but coming down somewhat as they get age; carcass, long, broad, straight and deep; ham, heavy, and well let down; bone, fine; carcass, when fat, composed mostly of lard; hair, ordinarily rather thin. The fattening qualities are very superior; as breeders they are very prolific, and are fair nurses.

SECTION VI.—HISTORY AND CHARACTERISTICS OF AMERICAN BREEDS—POLAND CHINA.

The Poland China swine were originated many years ago in the Miami Valley, Ohio, by crossing the Russian hog and the Byfield upon the native breed of the country. The Bedford is also stated as one of the crosses. As early as 1816 China sows were introduced there by the Shakers of Union Village, Warren County. They were designated "big-boned China." Subsequently others were used. In 1835 or 1836 the Berkshires were introduced. In 1838 or 1839 the Irish Grazier was introduced and liberally used in crosses in connection with the Berkshire.



CHESTER COUNTY BOAR.



GROUP OF SUFFOLK SWINE.

From these beginnings the original stock, by judicious selection and feeding, were brought to high perfection. The swine were distinctively white and black. Later, although not so stated, infusions of Berkshire blood were probably used, and the best representatives are now quite black except small, distinct markings of white.

CHARACTERISTICS OF THE POLAND CHINA.

The best specimens have good length, short legs, broad, deep back, deep sides, flanking well down to the legs, broad, full, square hams and shoulders, moderately drooping ears, short head, wide between the eyes; the whole animal black, except more or less spotted white, as the fancy of the breeder seems to direct. As model hogs, when fat, we have seen few superiors. As heavy weight, with constitutional vigor, they will compare with any of the modern breeds.

SECTION VII.—CHESTER WHITE

The Chester White are said to have originated through the importation of swine from Bedfordshire, England. These were crossed with the best native swine. Later the Suffolk and Berkshire were used in crossing in individual cases, but some discarded this progeny. Selection, and perhaps a Suffolk cross, has much refined the original Chester Whites, which were inclined to be coarse.

CHARACTERISTICS.

Their characteristics are: Head short and broad between the eyes; ears thin, projecting forward and lopping at the point; neck short and thick; jaw large; body lengthy and deep; back broad; hams full and deep; legs short and well set under the body; hair thin, white and straight; if a little waved it is not objectionable; tail should be small and without bristles.

SECTION VIII.—DUROC-JERSEY.

The positive origin of this now fashionable breed, as improved within the last twenty years, is unknown. The distinctively red hog of England is the Tamworth. There is, however, no record of the importation of specimens of this old breed, but it is more than likely that individuals were brought over by settlers from England to New Jersey. As a boy, more than fifty years ago, we remember that red hogs were common in New Jersey and thought highly of. Yet the Tamworth Reds were not highly prized in England and were localized there. The

most probable solution is that the Durocs wore the early value to the Berkshire, which even now will show its original sandy color in rare cases, even in the purest bred.

The original Jersey Red, however, was a coarse hog, as we now understand the term, rather high on legs, coarse hair, inclining to bristles on the back, and with hairy tail and brush. They were valued especially for their strong constitution, capacity for making heavy weights and freedom from mange and other constitutional swine diseases.

CHARACTERISTICS.

The Durocs as bred in New York for years combine fineness of bone with large size, quietude, aptitude to fatten, freedom from constitutional diseases and capacity for growth.

SECTION IX.—CHESHIRE SWINE.

There is some obscurity as to this breed having originated, as claimed, from a pair of swine brought to Albany, N. Y., from Cheshire, England. There is no breed distinctively known as Cheshires in England. Neither is there a record of the importation. The Yorkshires have, however, been long known in New York and Canada, and the breed is undoubtedly made up of such crosses on the best white hogs of the Empire State, early famous for superior swine.

CHARACTERISTICS.

The Cheshire should be pure white in color, skin thin and with a pink tinge. They should have but little hair, though pigs of the same litter may differ much in this respect. Snout long but slender and fine, with jowls plump and ears erect. The shoulders are wide, the hams full, the flesh fine-grained and remarkable for the amount of mess pork to the offal. Like the finest-bred Suffolks, they cannot stand exposure to the sun, and like the Suffolks, tails of the young pigs are inclined to drop off. For the pen, however, they are admirable swine.

SECTION X.—VICTORIAS.

The Victoria swine, of New York, are represented to have descended from a sow called "Queen Victoria," and to have been originated by crossing a strain of Irish Graziers with Byfield, and by subsequent crosses with Yorkshire and Suffolk. They are medium in size, good feeders, fatten readily at any age, and they carry a fair coat of hair.

CHARACTERISTICS.

The color is pure white; hair fine and soft; head

PAIR OF POLAND-CHINA SWINE.



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thin, fine and closely set to the shoulders (that is, the neck is short); the face slightly dishing; the snout short; ears erect, small and thin; shoulders bulging and deep; legs short and fine-boned; back broad, level and straight; body long, hams round and swelling, high at base of tail, with folds between the thighs; tail fine and free from wrinkles or rolls; skin thin, soft and elastic.

SECTION XI.—THE PERFECT HOG.

A committee of the American Swine Breeders' Association, appointed to determine the essentials of a first-class hog, reported, and from which we reproduce the salient points:

A FIRST-CLASS HOG

Must have a small, short head, heavy jaw and thick, short neck; ears small, thin and tolerably erect; not objectionable if they droop slightly forward; must be straight from the neck back to flank; must be let well down to the knees in brisket; of good length from head to tail; broad on the back; ribs rather barrel-shaped; must be slightly curved or arched in the back from shoulder to the setting on of tail; tail small; long in the ham from hock to setting on of the loins; shoulder not too large, to give symmetry to the animal; ham broad and full; hair smooth and evenly set on; skin soft and elastic to the touch; legs short, small and well set under; broad between the legs; good depth between bottom and top of the hog; with pleasant, quiet disposition; should not weigh more than three or four hundred pounds gross at twelve to eighteen months old, according to keep; color may be black or white, or a mixture of the two. The above-described hog will measure as many feet from the top of the head to setting on of tail as he does around the body, and will measure as many inches around the leg below the knee as he does feet in length around the body; depth of body will be four-fifths of his height.

CHAPTER II.

BREEDING AND FEEDING OF SWINE.

SECTION I.—PRINCIPLES OF SWINE BREEDING.

The principles involved in the breeding of swine, generally, are those applicable to the breeding of other farm animals. Swine, however, are bred with a view as much to their fat as their flesh. In comparison with other animals, but little is eaten in a

fresh state. The great bulk is eaten salted, or cured in some other way. Next in importance to the flesh, and nearly equal in value, is the lard, as a commercial production. Hence, those breeds that will produce the greatest proportion of lean meat in the hams and shoulders, with large development of fat about the kidneys, back and sides, and with well-streaked lean with the fat of the flanks, is what the breeder seeks in connection with a moderate-sized head, fine bone and light offal generally.

Another departure from the principles of high breeding as now established, is that in-breeding of swine must be followed with great care. The hog is naturally inclined to scrofula, tubercles, and also, from his omnivorous feeding, to parasites of the flesh. The taint of scrofula is quickly intensified by close in-and-in-breeding. Hence while purely-bred hogs are the foundation of usefulness, and require to be kept intact, the best success, so far as meat is concerned, is found in the half and three-quarters bred swine, using strong, roomy, healthy sows of mixed blood for the foundation stock, or else cross-bred animals between two pure breeds. The bulk of the best swine in our market are, and will always be, probably, from thoroughbred sires upon the mixed stock of the country. There are now so many pure and composite breeds, as noticed in Chapter I, that the practical market breeder need not err.

SECTION II.—CROSS-BRED AND GRADE SWINE.

The breeder for pork, bacon, hams and lard, where the highest quality is desired, will, of course, seek pure-bred or cross-bred swine. Cross-bred swine are the product of two distinct breeds. Pure bred swine are the produce of two animals of a distinct breed, as the Berkshire, Poland-China, Duroc, etc. Grades, like those of any other animal, are the produce of any two animals of a species, one of pure and the other of mixed blood; the grade also being estimated as in other breeding by the amount of pure blood contained; as first cross, one-half; second cross, three-quarter blood, etc.

SECTION III.—SHELTER FOR SWINE.

There is no one of the farm animals so susceptible to cold and also to heat as swine. They are essentially without covering, since the hair on all well-bred swine is thin, and in no breed is it well adapted as a protection. In a state of nature swine seek the densest thickets, where a bed is made, which a number of individuals occupy in common. In the sum-



DUROC-JERSEY RED BOAR.



DUROC-JERSEY RED SOW.

mer water is sought for its cooling effects, and as a protection against insects, and skin and other scrofulous diseases. The animals wallow in or encrust themselves with mud, as a protection against heat, parasites and skin diseases. Hence the sagacious man will be able to meet these necessities intelligently.

RANGE FOR SWINE.

If swine cannot have sufficient range in summer where they may find mud and pure water, they must be washed often. In winter the shelter must be—however it is made—of such a nature that the animals can be made comfortable without too many of them crowding together. Four hogs are as many as ought to lie together. When swine are kept in hog barns, they should be so arranged that the cleaning, feeding and other required necessities may be accomplished in the most economical manner.

HOG BARN.

On a large scale we have found a two story building, twenty-one feet square, with wings to contain the feeding pens, the upper story of the central building to be devoted to grain, ground feed, etc., to be delivered below by appropriate chutes, to be the most economical. The first story contains the boiler or steamer, feed car and other necessary arrangements. The swine are kept in pens contained in wings (as previously stated) twenty one feet wide and as long as necessary. This will allow for a passage-way five feet wide between the rows of pens, and four such wings may be extended from the central building with yards attached to each pen.

SUMMER FEEDING.

The summer feeding of hogs is a question upon which many practical feeders disagree. A very large number believe that pigs may be put immediately upon meal at the time they are weaned, and thus fed until they are turned off fat. Others again follow an entirely opposite course. They allow the pigs to shirk for themselves, on sometimes indifferent pastures, perhaps grudging them a little corn when the grass is dried up in July and August. They winter them on just what corn will serve to keep them alive during the winter, pasture the succeeding summer, and turn them off some time during the succeeding winter, corn-fed, or else sell them in the autumn to feeders who fatten them.

TO RAISE HEALTHY SWINE.

Neither of these classes ever made any money off of pork, and unless the pigs bought of the latter class came at a very low price, the feeder who buys them makes little or no profit. The middle course is the correct one; there is no class of farm stock that pays so illy for wintering as swine, unless the owner have so much timbered range that the animals can pretty much get their living summer and winter. Such cases are very few. The proper system of summer feeding is when the pigs have been fairly weaned, to put them on pasture where they may have plenty of young clover, and to feed them in addition, what mixed food or grain they will eat.

Mill feed and corn meal in equal proportion, will form the bone and muscle necessary to make the growing frame what it should be. Whatever milk and refuse there is from the dairy should, of course, be fed, but this really goes but a little way in feeding a drove of hogs.

After harvest the swine should be turned into the stubble to consume the gleanings. Here they should be allowed to root. We believe that much of the loss in swine from that large class of diseases, mis-named "hog cholera," arise from disordered digestion, from ringing swine, in connection with the exclusive feeding of corn. The weakened system also renders the stock liable to lung diseases, scrofula, and the attacks of internal parasites, to which swine are predisposed.

THE GROUND-WORK OF BONE AND MUSCLE.

If the pigs are fed liberally upon food of mixed grain, ground together, or if peas, where this crop may be grown, or some rough grain should be sown in which the pigs could be turned to "hog it down," it would be better. But the most economical feeding in the prairie region of the West, at least, is to sow oats or rye, to be ground with corn, or to use the light grain of these crops together with the light grain of wheat, and such barley as may not grade in the market for malting.

Where mills are near, or in districts convenient to railroads, mill feed is the cheapest food that can be bought to mix with corn meal. By mill feed, we mean all the ground refuse of merchant mills except bran.

SUMMER FEEDING.

When pasture becomes dry, a field of clover should be reserved for cutting and feeding. As soon as corn begins to glaze, or as soon as it gets too hard for

boiling, it makes excellent feed to keep pigs thriving. In fact, the summer feeding must be so managed that the pigs, in September, may be put on corn, and turned off the same winter, weighing to average, 200 pounds and upward.

ECONOMY OF COOKED FOOD.

If the pigs have been kept growing through the summer on grass and grain, and if facilities are had for cooking—and no farm where hogs are kept is complete without it—pumpkins and windfalls of fruit, parsnips, beets, small potatoes and other roots may be economically boiled with corn meal, or other ground food used. All these not only serve to keep the digestive system in good condition, but they also furnish the organic and inorganic matter necessary to the full development of the animal system. Among garden vegetables, none are more valuable than cabbages, and the entire head may be used, including the outside leaves.

SECTION V.—WINTER FEEDING.

The winter feeding of swine should only be employed to carry through the breeding hogs, the fattening pigs to be turned off in the spring, and such late pigs as will not make sufficient weight to be fattened during the winter, but must be reserved for the clover field the next summer, and to be fattened all the way from June until September. Some succulent food is necessary. Pumpkins may be kept until January with little trouble, if piled in a dry place and covered with litter sufficient to keep them from freezing. Rutabagas may be fed after this time; parsnips are also excellent food, and cost less to raise than most people suppose. They may be harvested by plowing deeply close to the rows, going around the entire patch, and then following with a sub-soil plow deeply underneath, going the reverse way from the turning-plow. This cuts or loosens the roots so deeply, that what little tap root is left in the ground matters little.

ECONOMY OF ARTICHOKE.

An ample field of artichokes should be raised each year by every hog grower. Small pieces may be dropped at any time in the spring, at distances of one foot, in pretty deep furrows, three and a half feet apart, or they may be dropped in every third furrow in plowing and covered by the next furrow. Cultivate the same as corn, one way, until the stems are three feet high, and thereafter they will take care of themselves. The hogs should be allowed to root

out the crop as they will, at any time after the first of October, and during the winter when the ground is not frozen, and also in the spring, until the plants again start into growth. Thus artichokes will remain in the ground and produce a crop each year. But the most economical way is to replant the same patch each year, and cultivate down such as are not in the line of rows.

BOILING FEED.

Many persons suppose that the boiling of feed is expensive. It is not so. Where boiling is followed, the mistake is in using too small a kettle. Nothing smaller than a four-barrel kettle should be used, and it should have a tight-fitting covering of boards to keep in the steam. This is made by clinch-nailing or screwing three-quarter inch boards across each other securely, and sawing to a true bevel to fit the flange of the kettle. If such a kettle is filled with ear corn, three-quarters full, with water enough to fill quite full, the cover fitted close, and brought to a full boil, and left to cool, the corn will be found entirely soft, and much of it cracked open.

Hogs thrive wonderfully upon corn so boiled, and fed warm. If a steamer is used, the barrels or tanks must be closed tight, and with water enough so the feed is cooked by moist steam. Cooking by dry, super-heated steam should never be allowed. It does not moisten the food sufficiently, unless it has been previously soaked, and then it is apt to become caked. We like better than any other plan, sufficient tank room so ear corn can be cooked, using one set for one day's feeding, and another for the next.

CHAPTER III.

CARE AND MANAGEMENT OF SWINE.

SECTION I.—THE FARROWING OF SOWS.

The general management of swine is a matter that requires careful consideration. The time for farrowing of sows must depend upon the facilities for caring for the pigs. If a proper hog barn, with a warm fire-heated apartment containing farrowing pens, has been provided, February or the first days of March is not too early for young pigs; but if some place where pigs may be kept warm has not been provided, mild, settled weather must have arrived before the time of farrowing comes. Young pigs are more tender, if possible, than young lambs, and if in the least chilled will not attempt to suck; and, unlike ewes, the sow will not allow interference with the

pigs. The cost of a proper farrowing place and fire, however, is so little, that it should form a part of every hog barn as well as of every sheep barn.

This being provided, pigs may come at any time during the winter, safely, and will be ready for clover in the spring, early feeding in the fall and make heavy weights early the succeeding winter or when eleven or twelve months old.

SECTION II.—CARE OF SOWS.

Sows should be placed in the farrowing place at least a week before their time is up. It is an instinct with them always to seek one particular place of rest. It is an instinct with them, also, to provide a suitable nest for sleeping, and especially so for farrowing. They should have such food as will conduce to allow free expansion of the parts necessary to the expulsion of the fetus. Vegetables, especially cabbage and potatoes, cooked with their food do this. At farrowing time, and, indeed, a month before, it is well to feed them some animal food. Any refuse flesh food, cooked; greaves from the rendering tanks, or even a little fat pork in lieu of other flesh should be given. The refuse of fat trying establishments is probably best, and may form a portion of their food once or twice a week. After farrowing, they should be fed liberally with rich and varied sloppy food, beginning the third day after farrowing, and increasing the feeding as the pigs begin to grow. You cannot expect good pigs without good feeding; and after danger of inflammation and puerperal fever is over, the food should be constantly, but slowly increased until full feeding is given, when the pigs are about two weeks old.

SECTION III.—CARE OF PIGS.

When the pigs are two weeks old they should be tempted to eat by giving them a separate trough where the sow cannot get to it. The best food is fine oatmeal, boiled long enough so it will mix intimately with milk. It should be made so that when cold it will be thin enough to be easily stirred with a spoon—in fact, a very thick gruel, then it will mix nicely with the milk. It should be seasoned slightly with salt, and it is better if very slightly sweetened with molasses or sorghum. If oatmeal cannot be had, coarse middlings stands next, and in lieu of this, corn meal ground very fine. In any event the food must be very thoroughly cooked.

If the sows give but one litter of pigs a year, and we favor the plan—unless exceptional facilities are

had for caring for the young pigs and feeding them—it is better to let the pigs follow the sow as long as she will allow. Until they go on to pasture, a good, dry yard should be allowed for exercise, and to induce this, some grain, not usually given, and which the sow likes, should be scattered thinly on the ground. Buckwheat, barley, and ripe sorghum seed will be indicated.

SECTION IV.—WEANING PIGS.

The proper weaning of pigs is important. This should never be done until they are fully accustomed to solid food. This does not take place until they are two months old, and not fully until they are three months old. In fact, swine do not come to their full digestive powers until the age of six or eight months, and until this age they should not be given an exclusive grain diet. All the milk and butter-milk that can be spared should be allowed the suckling sows and the pigs, both before and after weaning. If they do not go on clover, green food must be given—clover, alfalfa, pig-weed, amaranth and parsley are all greedily eaten. At the age of three months the pigs should be fully able to take care of themselves, on grain and what clover they will eat. The change, however, should have gradually been made from weaning time. Thenceforward, the only question will be to so feed as to keep the pigs thriving and growing as fast as possible, and to lay a strong and firm bony and muscular foundation for the final fattening process.

SECTION V.—FEEDING FOR PORK.

The degree of fatness to which swine may be brought depends entirely upon the health and constitutional ability of the animals to consume food. It is for that reason we have urged the necessity of a diversity of food to quickly develop bone and muscle. Hogs, like all other animals, take on flesh and fat faster when young than when fully grown. That is, the daily gain is a constantly decreasing integer as the animal grows older. (See tables of gains in the department devoted to cattle.) The same effect has been shown with hogs. The longer an animal is fattened the smaller the daily gain. One principal reason is, that as fat increases the stomach decreases in size. Another is, that the animal does not hold the same appetite as when lean. Hence in the fattening of all animals, and especially in swine, the quality and diversity of food must be increased as the fattening proceeds. Grass will fatten to a certain

degree, while grain will fatten to a still farther degree; ground food will still farther continue the process, and the ultimate assistance is reached, so far as food is concerned, when the materials are cooked.

WARMTH ABSOLUTELY NECESSARY TO SWINE.

There is, however, another integer in fattening, previously noticed in connection with cattle; this is warmth. No man ever made money on hogs who allowed them to sleep cold. No man ever made money in fattening swine in cold pens in winter. The little room required by hogs in the feeding and sleeping apartments, would fully justify fire heat in cold climates, when fattening is carried on in winter, throughout all that region where coal is cheap.

CHAPTER IV.

DISEASES OF SWINE.

SECTION I.—PREVENTION OF DISEASE.

The prevention of disease in swine is of far more importance than the cure. No animal is so difficult to manage in the forcible administration of medicines. Swine are subject to but few diseases; of these those of an inflammatory nature are most prevalent, and these are chiefly confined to the vital organs and the viscera. If contagious or malignant epidemic disease attack hogs, the cheapest way to get rid of the difficulty is to send the affected animals at once to the rendering tanks. This, and perfect isolation of all the healthy hogs, including a complete change in high, dry, airy pastures or yards, with pure well water for drink, a thorough disinfection of yards, buildings, sleeping quarters, and burning of all material of which nests were made, with some alternative that swine will take in their food, will constitute the best general directions to be used.

SECTION II.—BREEDING INFECTION.

Nine-tenths of all the diseases of swine are produced from filth and other bad sanitary conditions, and until these are removed will go on decimating the drove until none are left. The hog is not a filthy animal, whatever may be said to the contrary. They wallow in filth and drink puddle water simply because they are forced to. They eat decayed food only when they can get no other, unless, indeed, they have been raised on such; then the taste is a "second nature." They root in the earth to procure roots and insects, which with fruits and herbage constitute their natural food. They wallow in the mud of

ponds in summer, incrusting their skin to ward off the attacks of insects and to preserve their skin from burning by the sun. But when the mud is dry if they can find a suitable post they will rub them clean. If clean, cool water is allowed them for bathing, they constantly seek it in summer and are seldom found wallowing in mud. Nuts, a comparatively few succulent plants, roots and grain constitute their food, and so delicate is their taste, that they discriminate far more nicely than cattle in their choice of food. If the coarser and the finer varieties of potatoes are given them, they first select the more delicate varieties used for the table and discard the strong and coarser varieties. They carefully make over their beds and air the material if allowed. From this the breeder and feeder may learn a lesson in their care both in sickness and health.

CHAPTER V.

CONTAGIOUS DISEASES OF SWINE.

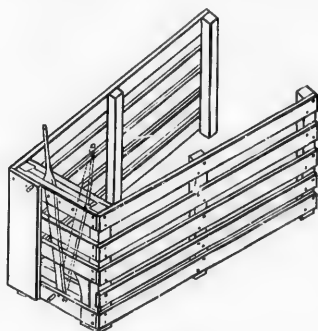
SECTION I.—ON CONTAGION.

Any violent disease that attacks hogs epidemically and fatally, is usually denominated hog cholera. The most of these are the direct outcome of bad feeding, bad quarters, and bad sanitary conditions generally. The only prevention is cleanliness in feeding places and yards, variety of food and absolutely pure water for drinking and bathing. Well water, if not contaminated with drainage of yards, or other surface water, is best. Next, running water not affected with wash from a higher source. Once swine are infected with any deadly contagion, remedies are, in the main, not available, from the difficulty in administering remedies and the usually fatal symptoms before the disease is to be combated. The only safe plan is to remove all animals not infected to a clean yard, or field, where they may get pure water, and, if possible, in summer pure mud (not filth) to wallow in. This, and bathing in water, always grateful to swine, constitute, with preventive remedies, the most common sense treatment. When actual disease exists, constant disinfection of premises should be followed.

HOG HOLDER.

Hogs are among the most difficult of animals to manage when they are required to be securely held for ringing, snouting, applying liniments, giving

medicine, etc. The cut shows one of the best devices we have yet seen, the invention of Mr. Charles B. Weeks, but the patent on which will expire during 1885. Two sections of parallel fence may be



A Hog Holder.

used for the sides. The engraving fully explains itself. The brake is shown open. As the hog tries to force his way through the brake is raised as shown in the dotted lines and the animal is securely held.

PREVENTIVE MEDICINES.

Among preventive medicines combining alterative or tonic qualities, the following are simple and have proved satisfactory. It is the formula of Prof. J. B. Turner, of Illinois, himself an extensive farmer, and may be used as a preventive in all that class of diseases known as malignant epizootic catarrh, contagious fever of swine, contagious pneumo-enteritis, all of which are often denominated hog cholera. Once these diseases are fairly seated, good nursing, care and sanitation are about all that can be done, unless under the direction of a competent veterinary surgeon. The formula, as recommended by Prof. Turner, for 100 swine, to be given in twelve gallons of gruel, or in pint doses to each swine, is as follows:

Flowers of Sulphur,	2 pounds.
Sulphate of Iron,	2 pounds.
Madder,	2 pounds.
Black Antimony,	$\frac{1}{2}$ pound.
Nitrate of Potash,	$\frac{1}{2}$ pound.
Arsenic,	2 ounces.

Powder the hard substances, and when mixed with

twelve gallons of gruel, one pint may be allowed each full-grown hog daily for a week. For smaller herds half the quantities as given may be prepared and given as needed.

If the sanitary care as recommended is used, and this preventive be given when an attack first appears in a neighborhood, but little loss will occur except in years when swine plague is especially general and malignant.

SECTION II.—HOG CHOLERA.

Contagious swine fever is that which most generally prevails under the various diseases heretofore denominated as hog cholera. The incubatory stage lasts from three to fifteen days. There will be shivering, prostration, the nose hot and dry; later, the animal more or less refuses food, lies under the litter, the eyes are sunken and the gait is unsteady. The temperature of the animal, as shown by inserting the bulb of a thermometer into the rectum, will be 103 to 105 degrees. There will be heat and soreness of the skin, with red patches and black spots, the pulse weak and rapid, the tongue highly furred, breathing quick, a hard, dry cough and soreness of the belly. There will be costiveness, followed by diarrhoea, and when this latter is fetid, slimy, and especially if bloody, the animal pretty surely dies.

If the symptoms are marked it is cheaper to kill and bury all such animals deeply. Get a clinical thermometer and inserting the bulb well into the rectum allow it to remain there half a minute and remove all hogs that show a temperature of 100 degrees or more. If there is constipation give two ounces of castor oil, with injections of warm water to assist the operation. Give also, two or three times a day, the following:

Nitrate of Potassa,	20 grains.
Bi-sulphate of Soda,	20 grains.

Mix in one pint of gruel.

If improvement commences give ten grains of quinine a day in two doses, with nourishing food and good care. All the animals of the herd should receive the prescription given under Section I.

CONTAGIOUS PNEUMO-ENTERITIS, OR PURPLES.

This form of so-called hog-cholera is occasioned by a minute organism (*bacillus*) found in the serous fluids and tissues of the body, and has its origin immediately in filthy quarters, low and wet feeding grounds during wet hot seasons, and is a contagious inflammation of the lungs and bowels, and is

accompanied with red and purple blotches on the skin, whence its popular name. It assumes, often, the erysipelatous form, and is accompanied with malignant sore throat. In such cases the better way is to kill at once and bury deeply. Sometimes when this form is assumed the animal will die in an hour.

TREATMENT.

One of the best means of procedure in all malignant cases of disease, where the lungs and bowels are implicated, is that prescribed by Prof. N. S. Townshend, who says

In the first stage of hog cholera, while there are copious and dark discharges from the bowels, two things are desirable: First, to give some absorbent, or alkaline substance, to correct the irritating character of the contents of the bowels. For this purpose one or two drachms of bicarbonate of soda, dissolved in milk or mixed with a warm mash of wheat-bran, will be useful. Some secure the same object by putting cinders and ashes within reach of their swine, which they will often eat greedily. Ears of corn burnt almost to a charcoal are also a popular remedy in some localities. Charcoal and the small of stone-coal are also said to be useful.

The other indication at this stage is to give some cathartic that will excite the liver to activity. For this purpose twenty grains of powdered mandrake root may be given to a hog weighing from 100 to 150 pounds, or from ten to twenty grains of calomel may be used instead, and repeated if necessary.

If the disease has passed to the stage of constipation, the sulphates of soda or magnesia, in doses of half an ounce for hogs of the size above mentioned, may be dissolved in half a pint of water, and given once or twice a day until their effect is secured; or castor oil in doses of an ounce, mixed with a drachm of spirits of turpentine, may be substituted. Sometimes it may be more convenient to give sulphur with milk, in doses of an ounce or more.

When difficult breathing and cough have come on, the sides of the chest and throat should be rubbed with spirits of turpentine or some other strong liniment, and half a drachm of saltpetre, with a grain or two of tartar emetic, may be given two or three times a day, either with bran mash or dissolved in water, and poured down the throat, the snout being first elevated by a noose in a small rope. It should not be expected that one or two doses of any remedy will

effect a cure, or that any article, however valuable, will be equally suitable in all stages of the disease.

CHARBON, OR MALIGNANT ANTHRAX.

This fatal disease is often confounded with the foregoing. They are both occasioned by *bacilli*. In anthrax the *bacillus anthracis* are found in the blood, and this disease is easily transmissible to various animals. "Purples" is not transmissible to other species.

The apoplectic or splenic form of anthrax is what is known as bloody murrain in cattle and is a malignant inflammation of the internal organs.

Once it fairly attacks, the swine are better killed and buried. Then fully disinfect all lodging places and burn all litter, as in other contagious diseases. The prevention may be found under Section I, including the prescription.

MALIGNANT EPIZOOTIC CATARRH.

This disease may be known by difficulty of breathing, pawing with a lifting of the flanks, and a short hoarse cough. The head will be stretched out but carried low. There will be fever generally with constipation, but sometimes with diarrhoea, and the hog will be stiff and tottering in the movement.

Another term will show less coughing, but with decided paralysis. Constipation is followed by profuse fetid diarrhoea. The back will be arched, the glands enlarged and with scrofulous ulcers, and partial or total blindness will be exhibited.

At the first symptoms give twenty grains, to a full-grown hog, of powdered white hellebore in half a pint of milk, to induce vomiting. When this has operated give two to three grains of tartar emetic if the lungs seem principally affected, but if the bowels are the principal seat of disease, give, instead, two or three grains of calomel.

Give either of these in the half of a roasted but cold potato, if the animal will eat; if not, envelop in a little butter and place well back on the tongue, near the root.

Wherever the soreness exists, whether lungs or bowels, apply one ounce of powdered cantharides, mixed with four ounces of olive or cotton-seed oil. This is to be mixed for half an hour over a very slow fire, with constant stirring and well rubbed. If it does not blister in an hour, repeat.

When the hog gets relief, if the trouble has been in the bowels, give, every day for a week, twenty grains of sulphate of iron. If the lungs have been

the seat of disease, add thirty grains of carbonate of potash.

If there is constipation give one ounce of castor oil and a drachm of oil of turpentine in a pint of milk, but if there is diarrhoea, copious and dark, give twenty grains of podophyllin and two drachms of bicarbonate of soda.

In this disease, as in all other malignant diseases, it is altogether better to kill and bury than to doctor. In fact if every fat hog is killed whenever he refuses his first meal during the prevalence of epidemics, it will be money in the pocket of the owner.

SECTION III.—COMMON DISEASES OF SWINE.

The common diseases of swine are best met with good shelter, cleanliness and good nursing. Hogs are the most difficult of any of the farm animals to administer medicine to, from their stubbornness, and awkwardness generally. If they will not take the medicine in their food in all ordinary diseases, it is better to starve them until they will. When medicine must be poured down it is usual to pass a cord, with a slipnoose at the end, around the upper jaw, and twitch the hog up. A better way, however, is the pen and trap, figured, and which may be used for a variety of purposes.

INTERNAL PARASITES, MEASLES, ETC.

Measles is occasioned by the encystment of one of the immature stages of the tape-worm in hogs. By examination of the skin, small watery pimples will be found of a pink or red color. There is no remedy for the disease, and unless the pork of such animals is most thoroughly (completely) cooked the meat is dangerous as food. For this reason and the fear of eating pork infested with *trichina*, it should never be eaten unless fully cooked.

LARD WORM.

A worm about three-quarters of an inch long sometimes infests the leaf lard, the kidneys, liver, and the fat of the ribs of the hog. Another worm inhabits the kidneys especially. When present the hog will show signs of weakness in the back. There is no cure for these except in medicines that will be taken up by the blood and thus enter the general system of circulation. If a hog is especially valuable as a breeder, one-eighth grain doses of arsenic may be administered daily for several weeks, the hog being during this time allowed access to the soil, where he may root.

MANGE OR SCAB.

If hogs are infested with mange, use the prescription as given for the horse.

Lice are seldom found on hogs, except they are confined in illy-cleaned pens. If so, sponge freely with equal parts of petroleum and skimmed milk, shaken together in a bottle, until well incorporated. Shake also always before pouring on the sponge or soft cloth with which the hog is rubbed.

QUINSY, OR STRANGLES.

This is an inflammation of the glands (tonsils) of the throat, and is often quickly fatal from suffocation. It may be known by slavering, protrusion of the tongue, difficulty of swallowing, and by swelling under the neck and lower jaw. When found, cast and tie the pig firmly, and with a lancet on the point of a keen knife, scarify the skin of the throat so as to draw blood somewhat freely. Foment the parts with cloths wrung out of hot water. In the meantime the following injection should have been prepared:

Sulphate of Magnesia,	4 ounces.
Oil of Turpentine,	2 drachms.
Soap Suds,	$\frac{1}{2}$ pint.

Mix and inject at once. Swab the tonsils of the hog with equal parts of olive oil and oil of turpentine, and if the hog will eat give, mixed in a little gruel, tablespoonful doses of equal parts of the oil and of turpentine, until relief is had.

SNUFFLES.

This disease is catarrh in the head. If the animal be given warm quarters and soft food, it will be all that will be needed.

COMMON COLD.

This is sometimes called rising of the lights. Rub the throat and chest with mustard moistened with vinegar, and it will be a good plan to give it tar water to drink, or smear a little common tar on the back of the tongue daily.

INFLAMMATION OF THE LUNGS.

In the case of an attack of simple pneumonia, there will be quick and labored breathing, shivering of the body and limbs, loss of appetite, and more or less cough. The treatment is to rub the chest with mustard moistened with strong vinegar, and repeat if necessary. Internally give:

Nitrate of Potash,	2 drachms.
Bisulphate of Soda,	2 drachms.

Mix in a pint of gruel and turn down if the hog will

not eat. The animal must have warm, clean quarters and a good bed.

DIARRHOEA.

Young pigs often are subject to diarrhoea, generally when they are very young. It is generally due to diseased milk of the sow. Upon the first indication change the food of the sow, place charcoal and salt where it may be freely taken, and give a table-

spoonful of the following prescription in the food of the sow every time she is fed:

Fenugreek, powdered,	1 pound.
Anise Seed, powdered,	1 pound.
Chalk, powdered,	1 pound.
Gentian, powdered,	$\frac{1}{2}$ pound.
Carbonate of Soda,	1 ounce.

Mix thoroughly and keep in a bottle, to be used as directed.



EACH ENLARGED FIVE.

MODERN GAME FOWLS.

PHE.

Poultry.

CHAPTER I.

DISTINCTIVE BREEDS.

SECTION I.—BREEDS FOR EGGS.

Without going into the origin of barn-yard fowls, which would be uninteresting except to the amateur, we enter at once upon the practical points of breeds



Head of the Wild or Jungle Fowl.

for eggs, meat, and those kept purely for some special quality outside of the special production of food. The fowls that are called distinctive layers are all that class of fowls who show little or no inclination to sit. These are the Hamburg, the Leghorn, the Spanish and the Polish fowls.

HAMBURGS.

The Hamburgs are divided into two classes, the Self-colored and Spangled.

The Spangled Hamburgs are of two varieties, the Silver and the Golden Spangled. The Black Hamburgs are deep black, with a metallic luster, alert, noble fowls, hardy, and the hens constant layers.

In the Silvered Hamburgs the ground color is silvery-white, sometimes with a slight yellow tinge, but each feather is distinctly margined with glossy black. The Golden variety have the same margins, but the ground color is a golden, yellowish color. They are particularly upright in carriage. Both cocks and hens exhibit the pencilings, but are white or brown, according to the variety.

In either variety the hens must have the body clearly and definitely penciled, and both cocks and hens must be quite free from dark marks. They are

both far less robust than the Black breed, and really are more fowls for the fancier than the farmer. They have all double combs ending in a point behind, and behind the wattles they have peculiar white or ashen ear-lobes.

THE LEGHORNS.

The Leghorns are among the most widely disseminated fowls in the United States, and are bred by fanciers from pure white to black, and various intermediate colors. Their beauty and strong laying propensity has made them general favorites, but it must be admitted that they are less hardy than the ordinary breeds of the farm-yard. Yet from their habit of laying in winter, when kept warm, they cannot well be gotten along without.

They have single serrated combs, and in the best specimens of hens these fall over on one side. The wattles are full and large. The ear-lobes, sometimes extending up on the face, white or cream-colored. In the white variety the legs are yellow, and the skin also. The chief difficulty with these fowls is that their immense combs are apt to freeze in winter. They are especially alert and elegant in carriage, the tails standing upright and handsomely set off with the sickle feathers.

SPANISH FOWLS.

This is another widely disseminated breed, and much liked on account of their laying propensities, notwithstanding the fact that they are rather tender in winter. But with thoroughly warm shelter they will lay an abundance of eggs, large and excellent. This race is especially badly off in wet weather, when they soon droop. Besides the pure white and the pure black, there are a number of other varieties catalogued, the gray or mottled, the blue or Andalusian, and the red-faced black or Minorca.

The comb is very large in all the varieties, single,

serrated, and the carriage is upright. In the hens the comb should fall to one side. That of the cock perfectly upright and without twist. The plumage of the black variety must be jet black, without other color, and that of the white variety pure white. The ear-lobes are large, pendulous and white. The tail is most handsome and erect, with very long sickle feathers, and the legs blue or dark lead color.

POLISH FOWLS.

The Polish fowls are chiefly remarkable for their immense crests or top-knots. In the hen it is globular, in the cock it falls down on every side. They are delicate and do not withstand our winter climate well, and their crests so cover their eyes that they are neither good foragers nor able to protect themselves from the depredations of hawks. Hence they are now not found except in the collections of fanciers, and seldom there.

SECTION II.—DISTINCTIVE AMERICAN BREEDS.

All fowls, of course, unite the two qualities of egg production and flesh. The breeds we have mentioned are remarkable for their egg production. Those we now mention are noted for fine flesh and at the same time are prolific in eggs. Those just noticed are remarkable as winter layers. Those to be mentioned now commence laying late in winter or early in the spring, according to the warmth of their quarters, and if their eggs are removed from the nest, will continue to lay until sometimes fifty or sixty will be deposited before they become broody.

THE DOMINIQUE.

Among the distinctively American breeds there is none superior to the Dominique when found pure. On the page showing points of fowls we illustrate this breed as the model for showing points. They are among the handsomest, as they are the most hardy of our barn-yard fowls, and without doubt are of the strong integers in the make-up of that other distinctively, though composite, American breed, the Plymouth Rock fowl. The Dominique, when pure, has an undulated penciling of slaty blue, on light ground, forming bands of color all over the body. The plumage of the cock is most distinct, often with golden hackles and bronzed wings. The comb should be single, though a double comb is admissible. The iris of the eye is bright orange, and the bill and legs yellow or buff. Their eggs are mealy, the flesh of the highest quality. They are

hardy, prolific, healthy, short-legged, active fowls, with light offal for their weight.

PLYMOUTH ROCK FOWLS.

This breed has many admirers, and of late years they have gained in the general estimation of the public, since their breeding has come to be quite uniform and excellent. Nevertheless, unless care is taken in mating, they will soon deteriorate in plumage, as must arise from their mixed breeding.

OSTRICH OR BUCKS COUNTY FOWLS.

This is another distinctive American breed, that originated in Bucks County, Pennsylvania. Hence one of their names. They have, not, however, been widely disseminated, although they are the largest of American breeds. The cocks sometimes weigh nine pounds.

The cocks are described as being dark blue black, the ends of the feathers tipped with white, the wings yellow or golden tinge, hackles dark glossy blue. The comb is double, of the kind denominated a rose comb, and the wattles are large. The hen is more sober in color and with a single serrate comb, but both are upright in stature, with short legs.

These fowls are good foragers. The hens lay large eggs, of good flavor, sometimes forty to fifty before becoming broody, and the flesh of the fowls when killed is white, firm and of excellent quality.

GEORGIAN GAMES.

Another distinctive American breed, although originally bred in Europe, have so long been bred in the south, and especially in Georgia, where they are highly prized, may now be called a distinctively American breed. They are not only game fighters, but they are also good layers, healthy, hardy, and well able to take care of themselves anywhere. Their flesh is of the first quality and for beauty of plumage, lofty carriage, elegance of shape and stout courage they have no superiors.

The color should be pure white, without shade in any part whatever, neck, breast, hackle or tail. The legs should be yellow, since this indicates constitution, but white legs are much prized. The comb, ear-lobes and wattles are of the brightest crimson, and the beak must harmonize with the legs in color. For the reason that they are an American breed, we have introduced them into this section, and in the next will give characteristics of some other of the more notable breeds.

SECTION III.—GAME FOWLS.

The Game fowl is not a farmer's fowl. They cannot be kept in confinement without pining, and they require a wide range to enable them to retain their characteristics of courage, hardiness, and delicacy of flesh and eggs. Yet we know some farmers who prefer this breed to any other, and it is certain that Games cannot be kept with any other breed and have the males of the latter survive. It must be admitted, however, that near large cities the farmer who breeds Games of high quality, and no other, reaps large profits from the sale of the male birds. Hence they must have a place here. They are distinctively of English breeds but remotely, original, probably, in Asia. Says an English writer:



Black Breasted Red Games.

"The Game cock is the undisputed king of all poultry, and is unsurpassed for courage. The Malay is more cruel and ferocious, but has less real courage. Game fowls are in every respect fighting birds, and although cock fighting is now very properly prohibited by law, Game fowls are always judged mainly in reference to fighting qualities. But their pugnacious disposition renders them very troublesome, especially if they have not ample range, although it does not disqualify them for small runs to the extent generally supposed. A blow with his spur is dangerous, and instances have been recorded of very severe injuries inflicted upon children, even causing death. High-bred hens are quite as pugnacious as the cocks. The chickens are very quarrelsome, and both cocks and hens fight so furiously, that frequently one-half of a brood is destroyed, and the other half have to be killed.

"Game fowls are hardy when they can have liberty, but cannot be well kept in a confined space. They eat little, and are excellent for an unprotected place, because by their activity they avoid danger themselves, and by their courage defend their chickens from enemies. The hen is a prolific layer, and, if she has a good run, equal to any breed. The eggs, though of moderate size only, are remarkable for delicacy of flavor. She is an excellent sitter, and still more excellent mother. The chickens are easily reared, require little food, and are more robust in constitution than almost any other variety.

"The flesh of the game fowl is beautifully white, and superior to that of all other breeds for richness and delicacy of flavor. They should never be put up to fat, as they are impatient of confinement. Mr.

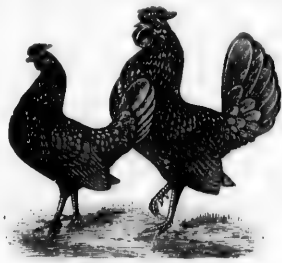


Duck-Wing Games.

Baily claims: 'They are in no way fit for the fattening-coop. They cannot bear the extra food without excitement, and that is not favorable to obesity. Nevertheless, they have their merits. If they are allowed to run semi-wild in the woods, to frequent sunny banks and dry ditches, they will grow up like them; they will have little fat, but they will be full of meat. They must be eaten young; and a Game pullet four or five months old, caught up wild in this way, and killed one or two days before she is eaten, is, perhaps, the most delicious chicken there is in point of flavor.'

"The cock's head should be long, but fine; beak long, curved, and strong; comb single, small, upright, and bright red; wattles and face bright red; eyes large and brilliant; neck long, arched and strong; breast well developed; back short, and

broad between the shoulders, but tapering to the tail; thighs muscular, but short compared to the shanks; spur low; foot flat, with powerful claws, and his carriage erect. The form of the hen should resemble the above on a smaller scale, with small, fine comb and face, and wattles of a less intense red. The feathers of both should be very hard, firm and close, very strong in the quills, and seem so united that it should be almost impossible to ruffle them, each feather, if lifted up, falling readily into its original place. Size is not a point of merit, from four to six pounds being considered sufficient, and better than heavier weights. Among the list of imperfections in Game cocks, Sketchley enumerates 'flat sides, short legs, thin thighs, crooked or indented breast, short, thin neck, imperfect eye, and duck or short feet.'



Sebright Bantams.

"The colors are various, and they are classed into numerous varieties and sub-varieties, of which the chief are—Black-breasted Red; Brown-Red; Silver Duck-wing Grays, so called from the feathers resembling those of a duck; Grays; Blues; Duns; Piles, or Pies; Black; White; and Brassy-winged, which is Black with yellow on the lesser wing coverts. Colors and markings must be allowed a somewhat wide range in this breed; and figure, with courage, may be held to prove purity of blood though the color be doubtful. Mr. Douglas considers the Black-breasted Red the finest feathered Game, and states that he never found any come so true to color as a brood of that variety. White in the tail feathers is highly objectionable, though not an absolute disqualification. White fowls should be entirely white, with white legs. The rules for the colored legs are very undecided. Light legs match light colored birds best. No particular color is imperative, but it should

harmonize with the plumage, and all in a pen must agree.

"The best layers are the Black-breasted Reds with willow legs, and the worst the Grays."

SECTION IV.—FANCY BREEDS.—BANTAMS.

There are few who do not admire Bantams. Their diminutive stature and varied forms, often grotesque, make them admirable ornaments to the poultry yard or the lawn, and none are finer than the game Bantams. Although they will drive the large Asiatic and other breeds we have never known them to mix with the large breeds when they had hens of their own kind. In our description of the various Bantams we have condensed from the best authorities on the several breeds.

GAME BANTAMS.

Game Bantams are exact miniatures of real Game fowls, in Black-breasted red, Duck-wing, and other varieties. The cocks must not have the strut of the Bantam, but the bold, martial bearing of the Game cock. Their wings should be carried closely, and their feathers be hard and close. The Duck-wing cock's lower wing-coverts should be marked with blue, forming a bar across each wing.

SEBRIGHT BANTAMS.

The Sebright, or Gold and Silver-laced Bantam, is a breed with clean legs, and of most elegantly spangled plumage, which was bred and has been brought to great perfection by Sir John Sebright, after whom they are named. The attitude of the cock is singularly bold and proud, the head being often thrown so much back as to meet the tail feathers, which are simple like those of a hen, the ordinary sickle-like feathers being abbreviated and broad. The Gold-laced Sebright Bantams should have golden brownish-yellow plumage, each feather being bordered with a lacing of black; the tail square like that of the hen, without sickle feathers, and carried well over the back, each feather being tipped with black, a rose-comb pointed at the back, the wings drooping to the ground, neither saddle nor neck hackles, clean lead-colored legs and feet, and white ear-lobes; and the hen should correspond exactly with him, but be much smaller. The Silver-laced birds have exactly the same points, except in the ground feathering, which should be silvery, and the nearer the shade approaches to white the more beautiful will be the bird. Their carriage should resemble that of a good Fantail pigeon.

OTHER BANTAMS.

The Black Bantams should be uniform in color, with well-developed white ear-lobes, rose-combs, full hackles, sickled and flowing tail, and deep, slate-colored legs. The White Bantams should have white legs and beak. Both should be of tiny size.

The Nankin, or Common Yellow Bantam, is probably the nearest approach to the original type of the family—the "Bankiva fowl." The cock has a large proportion of red and dark chestnut on the head, with a full black tail; while the hen is a pale orange yellow, with a tail tipped with black, and the hackles lightly penciled with the same color, and clean legs. Combs vary, but the rose is decidedly preferable. True-bred specimens of these birds being by no means common, considerable deviations from the above description may consequently be expected in birds passing under this appellation."

The Booted Bantams have their legs plumed to the toes, not on one side only like Cochin-Chinas, but completely on both, with stiff, long feathers, which brush the ground. The most beautiful specimens are of a pure white. "Feather-legged Bantams," says Mr. Bailey, "may be of any color; the old-fashioned birds were very small, falcon-hooked and feathered, with long quill feathers to the extremity of the toe. Many of them were bearded. They are now very scarce; indeed, till exhibitions brought them again into notice, these beautiful specimens of their tribe were all neglected and fast passing away. Nothing but the Sebright was cultivated; but now we bid fair to revive the pets of our ancestors in all their beauty."

The Pekin, or Cochin Bantams, were taken from the Summer Palace at Pekin during the Chinese war, and brought thence to England. They exactly resemble the Buff Cochins in all respects except size. They are very tame.

The Japanese Bantam differs from most of the other varieties in having a very large single comb. It has very short, well-feathered legs, and the color varies. Some are quite white, some have pure white bodies, with glossy, jet-black tails, others are mottled and buff. They throw the tail up and the head back till they nearly meet, as in the Fantailed pigeon. They are said to be the constant companions of man in their native country, and have a droll and good-natured expression.

All the Bantam cocks are very pugnacious, and

though the hens are good mothers to their own chickens, they will attack any stranger with fury. They are good layers of small, but exquisitely-flavored eggs. But no breed produces so great a proportion of unfertile eggs. June is the best month for hatching, as the chickens are delicate. They feather more quickly than most breeds, and are apt to die at that period through the great drain upon the system in producing feathers. When fully feathered they are quite hardy. The hens are excellent mothers. The chickens require a little more animal food than other fowls, and extra attention for a week or two in keeping them dry. Bantams are very useful in a garden, eating many slugs and insects, and doing little damage.

SECTION V.—MANAGEMENT OF POULTRY.

Some years since an article contributed to the National Agricultural Department, "Raising Poultry



Penciled Hamburgs.

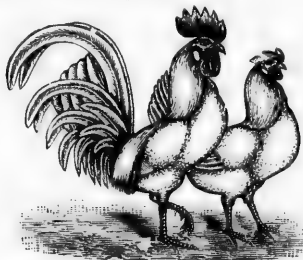
and Eggs for Market—By a New Englander," a gentleman known for his success not only in the production of poultry and eggs, but as a breeder of high caste fowls of pure breeds, contains correct ideas on the practical management of poultry. From this we condense some essential points as follows:

As to stock for breeding purposes, a selection is best made from the short-legged China (Brahma or Cochin—Ed.) male birds, to be introduced to the common native female stock. From their chickens selected birds only should be kept for future breeding, and the cross thus obtained are best bred back to the China male again, reserving from season to season only the short-limbed and well-shaped pullets from this crossing for subsequent use. In this way the better characteristics of the foreign blood are more uniformly retained, though it will be necessary constantly, as above recommended, each year to

select the most promising fowls in shape, size, etc., for breeding purposes; for it is a well-known fact that all crosses deteriorate after the first one.

For obtaining the greatest amount of eggs, or for the production of the best average quantity of flesh, fowls should never be kept beyond the full age of two years. It is well settled that during the first year of her life a well-fed hen will lay more eggs than ever afterwards. From the end of her second year she begins to fail as a breeder, and chickens usually raised from old hen's eggs are never so vigorous, so healthy, or otherwise so promising as are those hatched from the eggs of young birds; that is to say, those from one to two years of age.

Male birds are in their prime only down to the end of the second year, and should not be kept for propagation beyond that period of life. For ordinary breeding purposes a vigorous young male bird will serve advantageously twelve or fifteen hens, the former number being preferable, as a rule.



White Leghorns.

The males should be changed every season from one flock of females to another, and no male bird should be permitted to run with the same hens during more than a single season under any circumstances.

For the producing of eggs only, no male bird is necessary to be kept with the laying hens; and during the season of moulting it will be found of advantage, decidedly, to separate the cocks from the pullets altogether. These hints are offered for the consideration of those who desire to breed fowls systematically and to the best advantage in moderate quantities. Where large numbers of birds are kept, it is not absolutely necessary that these recommendations should be altogether observed; but for the purposes

of comparatively "good breeding," making no pretension to simply keeping up a purity of race, but rather for every-day purposes of the farmer, who is satisfied with fair profits, and who breeds for ordinary market, the hints proposed will be found generally advantageous.

"If it suits the fancy or object of the owner, his fowls may be of several breeds, without any risk of intermingling, the select breeding stocks being kept up by merely changing the cocks every second year; and not more than one cock to thirty hens need be kept for the general stock, as it is of no consequence whether all the eggs are impregnated or not." This has reference not to high breeding for the show rooms, but to the production only of poultry meat and eggs. The cost of fowl-keeping, first and last, if all the necessary food is purchased at ordinary market prices, will average not far from ten cents a head per month. With the run of the farm-yard, however, and only a moderate number of fowls, the cost is much less. In large numbers, say hundreds or thousands, the expense of keeping will reach the first-named estimate fully, if the birds are confined to limited quarters. This sum is fixed for the food dealt out only, the additional expense of care and interest upon investments for cost of buildings and fixtures, land occupied, etc., is not included, and must depend, of course, upon the extent of the establishment, the taste and means of the poultry-keeper, etc.

Where fowls are kept for profit, and especially when large numbers are present, attention should be directed to saving the feathers taken from them (if dressed for market), and also the manure from the houses—no inconsiderable item of value in each year. Wilson, in his "British Farming," says that "where a hundred common fowls and a dozen geese or ducks are kept, the quantity and value of the manure produced by them (but little inferior to guano), if kept by itself and secured from the weather, will surprise those who have not made trial of the plan." Where five hundred or a thousand fowls or more are kept, the importance of this item will be worth remembering.

In raising poultry, whether the object be to produce chickens for the market, or to obtain a supply of eggs, the first principle to be observed is absolute cleanliness in and around the houses they occupy.

During the brief fattening process, if this plan be

adopted at all, a range for the birds intended to be slaughtered is not necessary. On the contrary, for two or three weeks devoted to finally fitting fowls for the spit the more quiet they remain in their confinement (always supposing them to be kept cleanly and free from vermin) the better. For the London and Paris markets light even is also excluded from the fattening coops during the few weeks devoted to putting fowls in their best condition before killing. But this process is of doubtful utility, and the "cramming" method in vogue among certain breeders is generally deemed not only inhuman, but is undoubtedly not remunerative.

Fowls collected together in any number will get sick, and the query is often made, "How can they be

where a considerable number of birds is kept upon a single farm, the room assigned to each lot should be as liberally accorded as possible, in order to prevent immediate sickness among the stock, for the crowding of a large number of fowls into single enclosures is certain to generate roup and other diseases.

CHAPTER II.

FOREIGN BREEDS.

SECTION I.—BRAHMA FOWLS.

Of the large Asiatic breeds the Brahma fowls and the Cochins, and varieties of these breeds, combine the principles of excellence in the heavier classes of fowls, so far as hardiness, great weight, egg production and nursing mothers are concerned.

The Brahma-Pootra fowls, as they were originally called, were first received in England from the United States, but their origin is not wholly known, although it is distinctly Asiatic. They are among the best winter layers we have. Early hatched pullets often commence laying at five to six months of age, when well cared for, and continue all winter. The eggs are more or less buff colored. The chicks do not feather early, but they are not deficient in hardiness, and at from four to eight months old are in their prime as table birds. The weight of the mature cock will occasionally reach thirteen pounds and the hens two pounds lighter, but these weights are exceptional, ten pounds being a good weight for a cock, and eight pounds for a hen. In the old birds the flesh is coarse-grained, oily and often rank flavored. Nevertheless, their many merits quickly made them sought after, and they have continued to hold their own fairly among all competitors.

There has been much confusion first and last over the name of this fowl. They have so many points and characteristics in common with the old-time Shanghais, that they may be said to have been derived from this stock, modified and improved by careful breeding.

The editor of the *Canadian Poultry Chronicle*, an enthusiastic but correct writer on poultry, sums up the qualities of the Brahmas as follows:

"The great size of the Brahma at once renders it an object of attention. In this respect it surpasses all other breeds. Hens in their second year, with moderate care, will weigh from eight to ten pounds, and cockerels from thirteen to fourteen pounds each. The quality of the meat is also good; when toler-



Black Spanish Fowls.

cured?" If the fowl houses are kept thoroughly dry and clean, and the poultry free from vermin, there will be but little sickness among the chickens. When the case occurs, however, remove the bird that droops at once, knock it on the head, and bury it beneath the roots of the grape-vines.

For both laying and breeding fowls a range or walk is a necessity to their comfort, health and profitability. Without this convenience, to a greater or less extent—and the more liberal the range the better—it is futile to attempt to grow fowls to profit, and idle to expect them to produce eggs regularly. Good range, pure water, dry shelter, animal food, and entire freedom from filth, are all needful to promote high health and continuous prosperity in the poultry yard, but more or less range for laying fowls is the first essential to their well-doing. To afford this desirable accommodation space is required; and

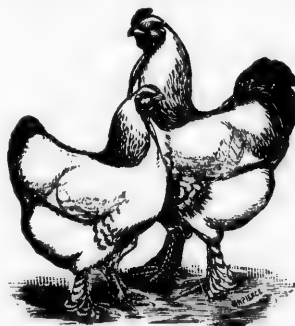
ably fed it will be found almost, and very often quite equal to the Dorking. There is probably a little less meat on the breast; but this is compensated by the extra quantity of that on the thighs; indeed, many people think the leg of a Brahma cockerel one of the best parts of the bird. If the object of the farmer is simply to produce chickens for the table or market, then a cross between the Brahma and a Dorking cock will produce truly magnificent fowls; the largest, perhaps, that have ever been reared. Chickens thus bred have, at the age of six months, attained the weight of eighteen pounds the couple, and over—no mean matter for the farmer's consideration.

"As a laying fowl, the Brahma is, in our opinion, equal to any other breed. There is no doubt that the propensity to sit interferes with the production of eggs. Notwithstanding this, the fecundity of the hens and pullets is very great. Brahma pullets will lay with great regularity at six to seven months old, and usually sit within two months after. They may thus be made exceedingly useful, where a regular supply of early birds for the market is desired. Indeed, no breed so eminently possesses the regularity and certainty in the time of incubation without carrying it to a troublesome excess. It is also remarked that the hen in her second year lays much longer than the pullets, and in this respect makes the fowl as a layer far superior to nearly any other.

"After the second year the tendency to incubate becomes greater and increases with age. We would, therefore, recommend that hens, after the third year, should be got rid of; nor, indeed, is there any necessity to keep them any longer, as pullets can always be had to supply their places. In connection with the production of eggs, we may mention another cross with the Brahma well worthy the attention of the farmer, that is, between a Brahma hen and a Spanish cock. This cross produces a fowl which for average fecundity surpasses any and every fowl we know."

The Brahmas are capital foragers where they have liberty, delighting in an extensive range, though they bear confinement well. They will lay from thirty to forty eggs before becoming broody, and are especially good winter layers. When the hens become broody a week's confinement will usually wean them of the habit; and in England, as in America, they are a favorite farmers' fowl. Mr. Piper, an English authority, says: The chickens are hardy, easy to rear,

varying in color when first hatched, being all shades of brown, yellow and gray, and are often streaked on the back and spotted about the head; but this variety gives place, as the feathers come, to the mixture of black, white and gray, which forms the distinguishing color of the Brahma. They reach their full size at an early age, and the pullets are in their prime at eight months. Miss Watts noticed that Brahmas "are more clever in the treatment of themselves when they are ill than other fowls; when they get out of order, they will generally fast until eating is no longer injurious," which peculiarity is corroborated by the experienced "Henwife." The feathers

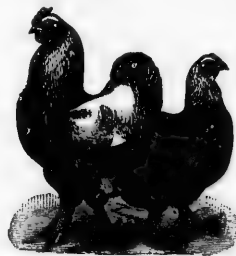


Light Brahmas.

of the Brahma-Pootra are said to be nearly equal to goose feathers.

The head should have a slight fullness over the eye, giving breadth to the top; a full, pearl eye is much admired, but far from common; comb either a small single, or pea-comb—the single resembling that of the Cochin; the neck short; the breast wide and full; the legs short, yellow, and well-feathered, but not so fully as in the finest Cochins; and the tail short but full, and in the cock opening into a fan. They should be wide and deep made, large and weighty and have a free, noble carriage, equally distinct from the waddle of the Cochin and the erect bearing of the Malay. Unlike the Cochins, they keep constantly to their color, which is a mixture of black, white and gray; the lightest being almost white, and the darkest consisting of gray markings on a white ground. The color is entirely a matter of taste, but the bottom color should always be gray.

"After breeding Brahmas for many years," says Miss Watts, "through many generations and crosses (always, however, keeping to families imported direct from America), we are quite confirmed in the opinion that the pea-comb is the comb for the Brahma; and this seems now a settled question, for single-combed birds never take prizes when passable pea-combed birds are present. The leading characteristic of the peculiar comb named by the Americans the pea-comb, is its triple character. It may be developed and separated almost like three combs, or nearly united into one; but its triple form is always evident. What we think most beautiful is, where the center division is a little fluted, slightly serrated, and flanked by two little side combs. The degree of



Dark Brahmas.

the division into three varies, and the peculiarities of the comb may be less perceptible in December than when the hens are laying; but the triple character of the pea-comb is always evident. It shows itself in the chick at a few days old, in three tiny paralleled lines." It is thick at the base, and like three combs joined into one, the center comb being higher than the other, but the comb altogether must be low, rounded at the top, and the indentations must not be deep. Whether single or triple, all the combs in a pen should be uniform."

The Brahmas are now divided into two distinct varieties, the light and dark, but differing essentially only in color. The legs are, in both varieties, strongly feathered to the toes, but the color of the skin of the legs is yellow.

SECTION II.—COCHIN-CHINA FOWLS.

This class of fowls, introduced into England in 1848, and immediately after into the United States, is now broken up into many varieties as exhibition

birds, and have many admirers. The principal varieties of the Cochins are, White, Buff, Cinnamon, Grouse or Partridge, Lemon, Silver Buff, Silver Cinnamon, Black, Cuckoo and Silky-Feathered Cochins. The Buff Cochin and the Partridge Cochin are the most widely disseminated, and in the best repute among farmers, although the White and the Black varieties have many admirers. Either of the last four named will give good satisfaction for hardiness, winter layers and as good nursing mothers.

There is no doubt that Cochins are among the most valuable of fowls for a limited space, although they are fair foragers when they have liberty. Pullets have been known to lay at fourteen weeks, and want to sit at six months. The eggs are of fair size, two and a quarter ounces each, of a pale chocolate color, and of good flavor. The chicks rear easily, though like the Brahmas they fledge late, but for frying, the chickens early acquire size. At the age of five to eight months they are fit for roasting or boiling, and are juicy and of fine flavor. Old birds, like those of other large Asiatic birds, lack meat on the breast, and are dry and tough. They also, as age increases, accumulate large quantities of internal fat, and hence should not be kept longer than the age of three years, even for the production of eggs.

A peculiar characteristic, technically called "fluff," is a quantity of beautifully soft, long feathers, covering the thighs till they project considerably, and garnishing all the hinder parts of the bird in the same manner, so that the broadest part of the bird is behind. Its quality is a good indication of the breed; if fine and downy the birds are probably well-bred, but if rank and coarse, they are inferior. The cocks are frequently somewhat scanty in "fluff," but should be chosen with as much as possible; but vulture-hocks, which often accompany the heaviest feathered birds, should be avoided, as they now disqualify at the best shows. "The fluff," says a good authority, "in the hen especially, should so cover the tail feathers as to give the appearance of a very short back, the line taking an upward direction from within an inch or so of the point of junction with the hackle." The last joint of the wings folds up, so that the ends of the flight feathers are concealed by the middle feathers, and their extremities are again covered by the copious saddle, which peculiarity has caused them to be also called the ostrich-fowl.

A good Cochin cock should be compact, large, and square built; broad across the loins and hind-quarters; with a deep keel; broad, short back; short neck; small, delicately-shaped, well-arched head; short, strong, curved beak; rather small, finely and evenly serrated, straight, single, erect comb, wholly free from reduplications and sprigs; brilliant red face, and pendent wattles; long hanging ear-lobe, of pure red, white being inadmissible; bright, bold eye, approaching the plumage in color; rich, full, long hackle; small, closely-folded wings; short tail, scarcely any on some fine specimens, not very erect, with slightly twisted glossy feathers falling over it like those of the ostrich; stout legs set widely apart, yellow and heavily feathered to the toe; and erect carriage. The chief defect of the breed is narrow-



Buff Cochins.

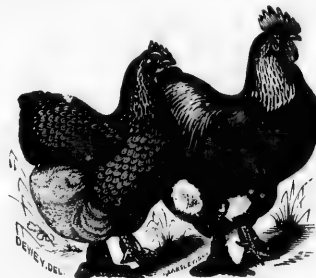
ness of breast, which should therefore be sought for as full as possible.

The hen's body is much deeper in proportion than that of the cock. She resembles him upon most points, but differs in some; her comb having many indentations; the fluff being softer, and of almost silky quality; the tail has upright instead of falling feathers, and comes to a blunt point; and her carriage is less upright.

Cochins lose their beauty earlier than any other breed, and moult with much more difficulty each time. They are in their greatest beauty at from nine to eighteen months old. The cocks' tails increase with age. In buying Cochins avoid clean legs, fifth toes, which show that it has been crossed with the Dorking,

double combs that betray Malay blood, and long tails, particularly taking care that the cock has not, and ascertaining that he never had, sickle feathers. The cock ought not to weigh less than ten or eleven pounds, and a very fine bird will reach thirteen; the hens from eight to ten pounds.

Buff birds may have black in the tails of both sexes, but the less there is the better. Black-penciling in the hackle is considered objectionable at good shows. The cock's neck hackles, wing coverts, back, and saddle hackles, are usually of a rich gold color, but his breast and the lower parts of his body should match with those of his hens. Buff birds generally produce chickens lighter than themselves. Most birds become rather lighter at each moult. In breeding, Grouse and Partridge hens should have a black-



Partridge Cochins.

breasted cock. The Cinnamon are of two shades, the light Cinnamon and the Silver, which is a pale washy tint, that looks very delicate and pretty when perfectly clean. Silver Cinnamon hens should not be mated with a pale yellow cock, but with one as near to their own tint as can be found.

In Partridge birds the cock's neck and saddle hackles should be of a bright red, striped with black, his back and wings of dark red, the latter crossed with a well-defined bar of metallic greenish black, and the breast and under parts of his body should be black, and not mottled. The hen's neck hackles should be of bright gold striped with black, and all the other portions of her body of light brown, penciled with very dark brown. The Grouse are very dark Partridge, have a very rich appearance, and are particularly beautiful when laced. They are far from common, and are well worth cultivating. The Par-

tridge are more mottled in their markings, and not so rich in color as the Grouse. Cuckoo Cochins are marked like the Cuckoo Dorkings, and difficult to breed free of yellow.

The White and Black were introduced later than the others. White Cochins should have yellow legs, and they are prone to green. The origin of the Black is disputed. It is said to be a sport from the White, or to have been produced by a cross between the Buff and the White. By careful breeding it has been fixed as a decided sub-variety, but it is difficult, if not almost impossible, to rear a cock to complete maturity entirely free from colored feathers. They keep perfectly pure in color till six months old, after which age they sometimes show a golden patch or red feathers upon the wing, or a few streaks of red upon the hackle, of so dark a shade as to be imperceptible except in a strong light, and are often found on close examination to have white under feathers, and others barred with white.

The legs in all the colors should be yellow. Flesh-colored legs are admissible, but green, black, or white are defects. In the Partridge and Grouse a slight wash, as of indigo, appears to be thrown over them, which in the black assumes a still darker shade, but in all three yellow should appear partially even here beneath the scales, as the pink tinge does in the Buff and White birds.

Cochin-Chinas being much inclined to accumulate internal fat, which frequently results in apoplexy, should not be fed on food of a very fattening character, such as Indian corn. They are liable to have inflamed feet if they are obliged to roost on very high, small, or sharp perches, or allowed to run over sharp-edged stones. They are also subject to an affection called white comb, which is a white moldy eruption on the comb and wattles, like powdered chalk, and if not properly treated in time, will spread over the whole body, causing the feathers to fall off. It is caused by want of cleanliness, over-stimulating or bad food, and most frequently by want of green food, which must be supplied, and the place rubbed with an ointment composed of two parts of linseed or cotton seed oil, one of turmeric powder and one-half part of sulphur. Six grains of jalap may be given to clear the bowels.

SECTION III.—ENGLISH BREEDS.

Of the distinctive English breeds the Dorkings in their varieties stand confessedly first. They combine

all the essentials of a first-class table fowl, are prolific in eggs, and good nurses. They are divided into several varieties, as follows: White, Silver-gray, Gray, Fawn-colored or Buff and Black Dorkings. The White, the Gray, and the Black varieties are the best of the class for farmers. Full grown cocks of either of these will weigh up to nine pounds each and hens seven pounds each. They all have five toes, a distinctive mark, generally single serrated combs, are full wattled and with long, sickle-shaped feathers in the tail. Aside from the fact that they are all sensitive to cold storms they are hardy and in every way most valuable fowls for the farmer's yard. The Gray Dorking seems to have been the original of the varieties, and is undoubtedly the best, though it is a disputed point, Mr. Brent, an English authority, claiming that the White is the only true and pure Dorking. They are certainly handsome, yet it is nevertheless true that white fowls are inclined to yellow fat.

Mr. Piper, an English authority, says of the Dorkings, that:

"The White Dorking must have the plumage uniformly white, though in the older birds the hackle and saddle may attain a light golden tint. The rose-comb is preferable, and the beak and legs should be light and clear.

"The colored Dorking is a large, plump, compact, square-made bird, with short white legs, and should have a well developed fifth toe. The plumage is very varied, and may have a wide range, and might almost be termed immaterial, provided a coarse, mealy appearance be avoided, and the pen is well matched. This latitude in respect of plumage is so generally admitted that the assertion, 'You cannot breed Dorkings true to color,' has almost acquired the authority of a proverb. They may be shown with either rose or single combs, but all the birds in a pen must match.

"The Dorking is the perfection of a table bird, combining delicately flavored white flesh, which is produced in greatest quantity in the choicest parts—the breast, merry-thought, and wings—equal distribution of fat, and symmetrical shape. Mr. Bailly prefers the Speckled or Gray to the White, as 'they are larger, hardier, and fatten more readily; and although it may appear anomalous, it is not less true that white-feathered poultry has a tendency to yellowness in the flesh and fat.' Size is an impor-

tant point in Dorkings. Colored prize birds weigh from eleven to fourteen pounds, and eight months' chickens six or seven pounds. The White Dorking is smaller.

"They are not good layers, except when very young, and are bad winter layers. The eggs are large, averaging $2\frac{3}{4}$ ounces, pure white, very much rounded, and nearly equal in size at each end. The hen is an excellent sitter and mother. The chickens are very delicate, requiring more care when young than most breeds, and none show a greater mortality, no more than two-thirds of a brood usually surviving the fourth week of their life. They should not be hatched before March, and must be kept on gravel soil, hard clay, or other equally dry ground and never on brick, stone, or wooden flooring.

"This breed will only thrive on a dry soil. They are fond of a wide range, and cannot be kept within a fence of less than seven feet in height. When allowed unlimited range they appear to grow hardy, and are as easily reared as any other breed if not hatched too early. If kept in confinement they should have fresh turf every day, besides other vegetable food. Dorkings degenerate more than any breed by inter-breeding, and rapidly decrease in size.

"Dorkings are peculiarly subject to a chronic inflammation or abscess of the foot, known as 'bumblefoot,' which probably originated in heavy fowls descending from high perches and walking over sharp stones. The additional toe may have rendered them more liable to this disease. It may now arise from the same cause, and is best prevented by using broad, low perches, and keeping their runs clear of sharp, rough stones, but it also appears to have become hereditary in some birds. There is no cure for it when matured except its removal, and this operation fails oftener than it succeeds; but Mr. Tegetmeier states, that he has in early cases removed the corn-like or wart-like tumors on the ball of the foot with which the disease begins, and cauterized the part with nitrate of silver successfully."

GRAY DORKINGS.

That the Gray Dorking is a strongly fixed original variety is sustained from the fact that Columella described it perfectly during the first century of our era, as the best fowl of his time, speckled in color, dark breasted, of fine plumage and with five toes. He also condemns the White as comparatively tender,

well known at the present day. The cocks of the Gray Dorkings weigh from ten to twelve pounds each when fully grown, and the hens seven to eight pounds.

The true colors of the Gray are. The breast, tail, and larger tail feathers pure black. The head, neck, hackle, back, saddle and wing-bow clear silvery white, and across the wings a well defined black bar. The neck of the hen is a silvery white, the breast salmon-red, modified to gray near the thighs. The wings a silver or slate gray and with no tinge of red. The tail is dark, becoming nearly black on the inside.

BLACK DORKINGS.

Those bred pure are jet black, the cocks tinged about the neck with a golden hue. In the hens this tinge assumes a silvered hue. The comb may be either double or single; the wattles small; the tail feathers shorter and broader than those of the White variety; the legs short and black; the fourth and fifth toe separate and distinct.

THE BOLTON GRAY OR CREOLE.

It will only be necessary to give a passing mention to this breed, and for the reason that the Bolton Gray, once famous in England, and bred with great nicety, was, with the Dorking and the Game, the original integers that have been constant in all that great class of fowls of mixed origin, originally known as barn-yard fowls.

The Bolton Grays were white about the head and toward the neck. The neck and body spotted with black, and with black bars at the extremity of the tail. They were plump, medium sized, short-legged fowls; great layers of rather small eggs, and the hens were not inclined to sit.

SECTION IV.—FRENCH BREEDS.

There is no doubt but where quality of eggs and flesh is concerned, combining great weight with light offal, and where good care may be taken of them, that the rearing of French birds near large cities would become very profitable. The same would be true where the eggs and poultry were consigned to commission house or dealer who has a specialty to do with first-class hotels and wealthy families. Nevertheless, they have made their way very slowly among fanciers, and are seldom to be found in the hands of farmers.

CREVE CŒUR.

The Creve Cœur is the best known of the French

fowls and is exceptionally peculiar in its characteristics. The Creve Cœur is large, black, or nearly so, but with age some white feathers will appear. The legs are short, clean and black, the body square and the chest deep. Of their extraordinary crest or comb Mr. Jacque, a well-known French writer on poultry, says: "Various, but always forming two horns, sometimes parallel, straight and fleshy; sometimes joined at the base, slightly notched, pointed and separating at their extremities; sometimes adding to this latter description interior ramifications like the horns of a young stag. The comb, shaped like horns, gives the Creve Cœur the appearance of the devil." The fowl is bearded and has a crest or top-knot of feathers behind. They are quiet, scratch but little and do not wander. They thrive well in confinement or with limited space, with good care, are docile and tractable, but, except in a dry climate and soil, are subject to roup and allied diseases. Hence they must have, if kept confined, sun and ventilation. They are great layers of large, pure white eggs.

The chickens grow so fast, and are so inclined to fatten, that they may be put up at from ten to twelve weeks of age, and well fattened in fifteen days. The Creve Cœur is a splendid table bird, both for the quantity and quality of its flesh. The hen is heavy in proportion to the cock, weighing eight and a half pounds against his nine and a half, and the pullets always outweigh the cockerels.

LA FLECHE.

La Fleche is thus described by M. Jacque: "A strong, firm body, well placed on its legs, and long muscular feet, appearing less than it really is, because the feathers are close; every muscular part well developed; black plumage. The La Fleche is the tallest of all French cocks; it has many points of resemblance with the Spanish, from which I believe it to be descended by crossing with the Creve Cœur. Others believe that it is connected with the Breda, which it does, in fact, resemble in some particulars. It has white, loose and transparent skin; short, juicy and delicate flesh, which puts on fat easily."

"The comb is transversal, double, forming two horns bending forward, united at their base, divided at their summits, sometimes even and pointed, sometimes having ramifications on the inner sides. A little double 'combing' protrudes from the upper part of the nostrils, and although hardly as large as

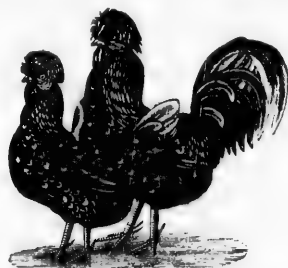
a pea, this combing, which surmounts the sort of rising formed by the protrusion of the nostrils, contributes to the singular aspect of the head. This measured prominence of the comb seems to add to the characteristic depression of the beak, and gives the bird a likeness to a rhinoceros." The plumage is jet black, with a very rich metallic lustre; large ear-lobe of pure white; bright red face, unusually free from feathers; and bright lead-colored legs, with hard, firm scales. They are very handsome, showy, large and lively birds, more inclined to wander than the Creve Cœur, and hardier when full grown; but their chickens are even more delicate in wet weather, and should not be hatched before May. They are easily reared, and grow quickly. They are excellent layers of very large white eggs, but do not lay well in winter, unless under very favorable circumstances, and resemble the Spanish in the size and number of their eggs, and the time and duration of laying. Their flesh is excellent, juicy, and resembles that of the Game fowl, and the skin white and transparent, but the legs are dark. This breed is larger and has more style than the Creve Cœur, and is better adapted to our climate; but the fowls lack constitution, particularly the cocks, and are very liable to leg weakness and disease of the knee-joint, and when they get out of condition seldom recover. They are found in the north of France but are not common even there.

HOUDANS.

The Houdan has the size, deep compact body, short legs and fifth toe of the Dorking. They are generally white, some having black spots as large as a shilling, are bearded, and should have good top-knots of black and white feathers, falling backwards like a lark's crest; and the remarkable comb is thus described by M. Jacque: "Triple, transversal in the direction of the beak, composed of two flattened spikes, of long and rectangular form, opening from right to left, like two leaves of a book; thick, fleshy and variegated at the edges. A third spike grows between these two, having somewhat the shape of an irregular strawberry, and the size of a long nut. Another, quite detached from the others, about the size of a pea, should show between the nostrils, above the beak."

Mr. F. H. Schroeder is of the opinion that the Houdan surpassed all the French breeds, combining the size, shape and quality of flesh of the Dorking

with earlier maturity; prolific laying of good-sized eggs, which are nearly always fertile, and on this point the opposite of the Dorking; and early and rapid feathering in the chickens, which are, notwithstanding, hardier than any breed except the Cochin and Brahma. They are very hardy, never sick, and will thrive in a small space. They are smaller than the Creve Cœur or La Fleche, but well shaped and plump; and for combining size and quality of flesh with quantity and size of eggs nothing



Houdans.

can surpass them. However this may be, either of the French breeds will give satisfaction, with care, where quality is concerned.

SOME PECULIAR BREEDS.

There are a number of peculiar breeds of fowls, some having real merit, as the old time short-legged breed called Creepers. Others are simply curiosities and confined solely to the yards of amateurs and breeders of special fowls. We have noticed all the breeds of practical value to the farmer, but, as interesting, we append one breed of value, and those that are purely fanciful.

DUMPIES, OR CREEPERS.

Scotch Dumpies, or Creepers, are almost extinct; fifty years ago they were common and much valued. They are profitable fowls and ought to be more common, as they are very hardy, productive layers of fine large eggs, and their flesh is white and of excellent quality. They should have large, heavy bodies; short, white, clean legs, not above an inch and a half or two inches in length. The plumage is a mixture of black or brown, and white. They are good layers of fine large eggs. They cannot be surpassed as sitters and mothers, and are much valued

for hatching the eggs of other fowls. The cocks should weigh six or seven and the hen five or six pounds.

SILKS, OR SILKIES.

The silky fowl is so called from its plumage, which is snowy white, being all discomposed and loose and of a silky appearance, resembling spun glass. The comb and wattles are purple; the bones and the periosteum, or membrane covering the bones, black, and the skin blue or purple; but the flesh, however, is white and tender, and superior to that of most breeds. It is a good layer of small, round and excellent eggs. The cock generally weighs less than three and the hen less than two pounds. It comes from Japan and China.

RUMPLESS FOWLS.

The Rumpkin, or Rumpless fowl, a Persian breed, not only lacks the tail-feathers but the tail itself. It is hardy, of moderate size, and varies in color, but is generally black or brown, and from the absence of tail appears rounder than other fowls. The hens are good layers, but the eggs are often unfertile. They are good sitters and mothers, and the flesh is of fair quality.

"FRIZZLED FOWLS."

The Friesland, so named from confounding the term "frizzled" with Friesland, is remarkable from having all the feathers, except those of the wings and tail, frizzled, or curled up the wrong way. It is small, very delicate, and a shower drenches it to the skin.

CONCLUSIONS ON POULTRY.

It will be seen that the poultry raiser must be careful and watchful to the wants of his poultry. They must be supplied with an abundance and variety of food, and pure water. They will not bear confined quarters in large numbers. Therefore, they must be provided with a run where they may scratch and satisfy their natural instincts. If eggs are expected in winter a warm roosting place must be furnished, and the fowls must be supplied with some animal food, and also green vegetables. The laying boxes must also be placed where there is no danger of freezing. Many of the best poultry fanciers heat their houses and feed warm food. In this way we have had early spring chickens begin to lay in January and February and even earlier, while late broods would commence laying about the time the first layers became broody.

CHAPTER III.

THE POINTS AND PLUMAGE OF FOWLS.

SECTION I.—THE POINTS OF FOWLS.

The characteristics of fowls vary exceedingly. They have single and double combs, single and double wattles, and these again vary largely in different breeds. They may be divided into ten groups: 1, our common or mixed barn-yard fowls; 2, Games; 3, English breeds; 4, French breeds; 5, Dutch or Hamburg fowls; 6, Leghorn and Spanish fowls; 7,

POINTS OF THE HEAD.

Coming now to the head we show the head of a cock with a single serrate comb.

The explanation is as follows: 1, the comb lying over the skull; 2, the wattles dependent from the lower jaw; 3, the ear wattles under the cheek; 4, the tufts of feathers covering the ear passages; 5, the cheeks, commencing at the nostrils, covering the face and re-uniting at the back of the head; 6, the nostrils, at the junction of the beak and



Dominique Cock, Showing Points.



Head of Cock, Showing Points.

Polish fowls; 8, Silky and Frizzled fowls; 9, Large Asiatic fowls; 10, Bantams. Or they may be naturally divided into four general groups: 1, common barn-yard fowls, to include English, American and European breeds; 2, Asiatic fowls; 3, Games; 4, Bantams. To illustrate the points of fowls we illustrate with the Dominique, a portrait of which we give.

Explanation.—A, neck hackle; B, saddle hackle; C, tail; D, breast; E, upper wing coverts; F, lower wing coverts; G, primary quills; H, thighs; I, legs; K, comb (rose or double); L, wattles; M, ear-lobe.

face; 7, the beak, consisting of two parts and corresponding to the jaws of animals, and consisting of the upper and lower mandible.

The comb is single when composed of only one piece. It is double when two like parts are united along the middle. It is triple when found of two like parts and one in the middle or horned as in the Creve Cœur fowls of France. The comb is said to be frizzled when it is filled with granulations, and excrescences. It is called a crown when circular, hollow or indented, and it is goblet-shaped when hollow, vascular and not indented.

The plumage of fowls is always in layers, one covering the other, and it affords a most perfect protection against cold, and to shed rain. There are three principal divisions of feathers: First, the large feathers of the wings and tail. Second, the medium sized feathers which cover the large feathers, and found also upon the wings and rump. Third, all those feathers that cover the neck, the

tufted fowls, when they are elongated into a top-knot or crest.

H—Bristle-like feathers covering the space which separates the wattles.

C—The neck hackles, extending to the head down between the shoulders, becoming longer and longer until they lap over those of the back at the butt of the wing.



Showing the Plumage of Fowls.

back, the sides, the throat, the shoulders, and parts of the wings. To give a better understanding of the plumage we have illustrated a fowl, back and front view, correctly lettered to show the position of the plumage and feathers of the various portions of the body. Alphabetically considered they are as follows:

A—The upper feathers of the head surrounding the skull. These are small, except in the case of

D—Saddle feathers. Those of the back forming regular layers, and of a similar character to the hackle feathers, extending from the neck to the loin.

E—The feathers of the back covered from sight when the wings are closed.

F—The breast feathers, covering the entire surface of what is known as the white meat on each side of the breast-bone. These feathers, together with those of the loins, overlap those of the sides.

G—The side feathers, covering the loins and extending back to the rump and overlapping beyond, covering the base of the feathers of the tail; also covering some of the feathers of the flanks, thighs and abdomen.

H—The light, fluffy feathers of the flanks, covering the upper part of the feathers of the thighs and intermingling with those of the rear portion of the breast.

on the toes and not on the foot. Bears walk on the foot like man.

M—The so-called leg (shank) feathers, extending in booted fowls from the heel to the toes.

N—The feathers of the toes, found in Asiatic fowls. These and the shank feathers are always in rows and on the outside. In vulture hooked fowls long feathers extend from the leg diagonally downward behind from the lower part of the thigh;



Showing the Plumage of Fowls.

I—The abdominal feathers, light, silky, fluffy and spreading, and enveloping all from the end of the keel or breast-bone to the rump.

J—The outside thigh feathers, covering a portion of the abdomen and leg.

K—The inside thigh feathers, corresponding to the outside, but smaller.

L—The lower thigh or leg feathers, extending to and covering the heel.

NOTE.—The heel is the joint corresponding to the hock joint in animals. Most animals and birds walk

more correctly that which corresponds to the calf of the leg in man.

O—The middle tail feathers, enveloping the rump and covering the bases of the larger feathers of the tail.

P—The larger feathers on each side of the rump, forming the tail.

Q—The outside shoulder feathers, covering a portion of the wing feathers.

R—The inside shoulder feathers, thinner and more slender than the outside shoulder feathers.

S—The larger wing feathers, growing from the under side of the pinion.

T—The outside pinion feathers, smaller and extending from the shoulder to the pinion, small at the outer edge and increasing to medium size on the inside edge.

U—The inside pinion feathers, covering the bases of the large ones.

V—The large flight feathers of the second joint of the wing, being those which most assist in flight.

X—The outside flight feathers, covering the true flight feathers stiff and flattened thereon.

Y—The inside flight feathers, covering the bases of the flight feathers.

Z—The pommel of the wing, containing middle-sized feathers covered with smaller ones, and increasing the spreading surface of the wing. It is in fact a finger-like process of the wing, seen in the plucked bird.

By turning to the illustration of the figured Dominique fowl, page 311, the proper names of the different classes of feathers will be found. In addition we may add that the primaries are the flight feathers of the wings used in flying, but unseen when at rest. The secondaries are the quill feathers of the wing. The wing coverts are the broad feathers covering the bases of the secondaries or quills. The wing bow is the shoulder part of the wing, and the wing butts the corners or ends of the wings. The tail feathers are the straight stiff feathers of the tail; the sickles, the curved feathers and the tail coverts, the soft curved feathers at the sides of the bottom of the tail.

CHAPTER IV.

TURKEYS, GEESSE AND DUCKS.

SECTION I.—PRINCIPAL BREEDS OF TURKEYS.

The wild turkey was originally generally distributed over the timbered regions of the West, and is the parent of the common bronzed turkey of domestication. But three distinct species are acknowledged, the common wild turkey (*Meleagris gallopavo*), the Mexican turkey (*M. Mexicanus*), and the Ocellated turkey (*M. ocellatus*), a native of Honduras and Central America.

Audubon states that when he removed to Kentucky, in the early part of the present century, turkeys were so abundant that the price of one in the market was not equal to that of a common barn

fowl now; and that he has seen them offered for the sum of three pence each, the birds weighing from ten to twelve pounds. The species are described by him as follows, and will readily be recognized by those who, as we, have hunted and trapped them:

The average weight is about fifteen to eighteen pounds (for the mature males), and the female from nine to ten. Some gobblers have been known to weigh much more than this estimate, and instances are not wanting where individuals have been obtained weighing thirty and forty pounds each; but this is rare. When full grown the male will measure four feet in length and nearly five feet in the stretch of its wings. The naked skin of the head and neck is blue, with the wattles red, as are also the legs. The feathers of the neck and body generally are a coppery bronze, changing in some lights to a greenish or purplish shade, and margined with an opaque line of velvet black. The back and rump are also black, with little reflection, while the sides, together with the upper and under tail coverts, are dark chestnut, barred with black near the end, and having metallic reflections of a rich purplish hue, while the extreme tips are opaque purplish chestnut. The tail feathers are dark chestnut barred with black, and tipped with a light chestnut. Near the end is a band of black, broadest on the outer feathers, and narrowing as it approaches the central ones. Between the bars on the feathers is a confused sprinkling of black. Neither upon the tail nor its coverts is there any white, and this is one of the ways by which the wild bird can always be distinguished from the domesticated. From the center of the breast hangs a long, coarse, hairy tuft, sometimes not found in the other sex. The female differs principally in being smaller in size, less brilliant in coloring, absence of the spur, and the small fleshy process at the base of the bill.

SECTION II.—MANAGEMENT OF TURKEYS.

The great weights to which the bronze turkey has been brought of late years has been the result of careful feeding and selection. Without these the breeder cannot succeed in keeping them up to the standard. In relation to the care and management necessary in the rearing and management of turkeys, the Encyclopedia of American Agriculture brings the whole matter into a nutshell, as follows:

Experience teaches conclusively that turkeys from two to five years of age are much better for breeding

than young birds. The person who aims to breed good turkeys should select from two to six of the best females that he can procure, from two to three years of age; then procure a male turkey, not less than two years of age, and not related to either of his hens. Breed from the same birds for three or four years. During this time save a few of the finest young hens for future breeding, then, when the old ones are discarded, procure another male turkey not related to the young hens. Afterward it will only be necessary to procure a male bird once in three or four years, but never mate him with any of his own young. As to color, the breeder must select according to his own taste. Size of the young depends a much upon the hens as the cock. By following this simple rule, with high feeding and good care when young, the breeder will most assuredly have the satisfaction of increasing the hardiness and strength of the young chicks and the size of his mature Christmas roasters.

The hen turkey possesses fair laying qualities, sits very steadily, and hatches in from twenty-eight to thirty days. As soon as the young poults are hatched confine the turkey mother or hen in a large coop in a very dry, sunny place; never allow the young to run till after the dew is off, nor during rainy weather. One year old turkeys are found to be the best mothers, and gobblers should not be kept more than three years. The first day the chicks require no food. The second day they may have equal parts of egg and milk beaten together and baked into a custard, also what cracked wheat they will eat. This may be alternated with boiled oatmeal and milk. Green food must also be given them, such as chopped dandelion, lettuce, etc. They should be fed at least four times a day.

The greatest care is required during the first two weeks of their growth, after which they may be allowed to ramble at will with the hen, being careful to feed them morning and evening. During the grasshopper season they will pretty well take care of themselves. The usual plan in the West is to allow the hen turkey to select her nest, hatch her brood, and pretty much care for them. In dry, warm, summer climates like the West, where there is plenty of range, we have found this the best, being careful to feed twice a day. In the autumn they may be fattened on whole corn, or better, be put in a tolerably dark place and fed with what cornmeal and oatmeal

mush they will eat, being careful to supply them with clean, pure water. In raising turkeys they should be proportioned about ten or twelve hens to one cock. Six hens to one gobbler would be better.

Ed. To save the trouble of watching them while seeking nests, prepare a yard of one-eighth of an acre for every fifteen birds, wherein nothing else is allowed to go.

The best arrangement for a nest is small houses, about three feet by three, gable-shaped, and three feet high in the center. Nests should be scattered about the yard, and if convenient, partially hidden by brush. Turkeys, North, lay in April, and if two or three incline to one nest, set another box at right angles and adjoining the one they covet. Take away the eggs every night and place them in parcels of sixteen or eighteen. Set several turkeys at the same time, as half a dozen flocks can be as easily cared for as one, and those hatched and taken off about the same time usually run together without fighting. As soon as they leave the nest they should have a yard twelve feet square for every two turkeys, by setting up boards, a foot wide, endwise.

The mother must be washed with tobacco-juice, and the young chickens dusted with snuff, to kill the lice, or sulphur and snuff, mixed in equal parts, sprinkled over the nest soon after the turkey begins to sit, and, as opportunity affords, dust the turkey herself. The young ones must be fed sparingly, at intervals of an hour, with coarse-ground Indian meal mixed with scalded sour milk curds, and fine-chopped hard-boiled eggs; in six or eight weeks they will be able to master grains of corn. They require watching for two or three weeks after being turned into the fields, lest they wander into heavy, wet grass and perish; and should be driven up every night and shut into a stable or barn. They will soon get accustomed to coming home, and in due time will aspire to a roost.

SECTION III.—PROFITABLE BREEDS OF GESE.

Of all the varieties of the domesticated goose, the most valuable is undoubtedly the Bremen; or, as they are called in England, the Embden goose. They are pure white in color and the feathers are the most valuable of any breed. Perhaps the reason why they are not so generally disseminated as the common gray and the Toulouse goose is, that they require water for foraging in to reach the best results.

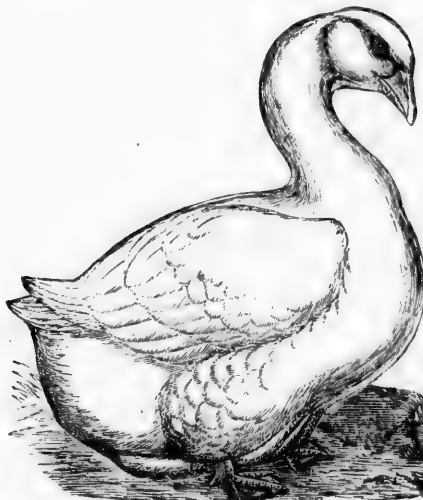
The Bremen or Embden goose is very large,

weighing from twenty-two to twenty-six pounds, live weight, and occasionally fully thirty pounds when in high flesh, and though so large, they are well proportioned, hardy, healthful, showy, quiet and peaceable, and take on flesh very rapidly with extra feed. The female lays about the same number of eggs as the common goose, but usually commences much earlier in the spring.

Fully equal to the Bremen, except in color, is the Toulouse, first brought to the United States from the

very quiet, fatten readily, and have excellent flesh. These, together with the common gray goose, generally disseminated, are all supposed to have descended from the gray legged goose (*Anser ferus*), which is still found wild in the north of Europe.

There are several breeds of Asiatic geese more or less disseminated. Of the Chinese breeds the Hong Kong, a brown goose of the largest size, with a large knob or excrescence on the top of the beak next the head, which increases in size with age. It is also



Embsen or Bremen Goose.

south of France. (See Page 347 for Illustration.) The Toulouse is distinguished from the common gray goose by the uniformity and constancy of its color, which is alike in both sexes and darker than in the common goose, and by its very large size, being as heavy as the best bred Bremen. They are rather short-legged, have round, compact bodies, and a large development of the abdominal pouch, which, in the common goose, is a mark of considerable age, but commences its appearance in this variety when but a few months old. Like the Bremen, they lay early in the spring, are

distinguished by a large fold of loose skin under the throat, called the dew-lap. This also increases with age. The attitude of the Hong Kong goose on the water is graceful and swan-like. On land it is erect and ungraceful, and its voice is harsh, loud and frequent. Neither is its flesh so good, we think, as either of the others named.

SECTION IV.—MANAGEMENT OF GEES.

Geese may be kept profitably where there is a rough pasture or common into which they may be turned, and the pasturage is not rendered bare; but even when the pasturage is good, a supply of oats,

barley, or other grain should be allowed every morning and evening. Where the pasturage is poor or bad, the old geese become thin and weak, and the young broods never thrive and often die unless fully fed at home. A goose-house for four should not be less than eight feet long by six feet wide and six or seven feet high, with a smooth floor of brick. A little clean straw should be spread over it every other day,

kept to one gander. Their breeding powers continue to more than twenty years old. It is often difficult to distinguish the sexes—no one sign being infallible, except close examination. The goose lays early in a mild spring, or in an ordinary season, if fed high throughout the winter with corn, and on the commencement of the breeding season on boiled barley, malt, fresh grains, and fine pollard mixed up with



Toulouse Goose, Male.

after removing that previously used, and washing the floor. Each goose should have a compartment two feet and a half square for laying and sitting, as she will always lay where she has deposited her first egg. The house must be well ventilated. All damp must be avoided. Although a pond is an advantage, they do not require more than a large trough or tank to bathe in.

For breeding not more than four geese should be

kept to one gander. Their breeding powers continue to more than twenty years old. It is often difficult to distinguish the sexes—no one sign being infallible, except close examination. The goose lays early in a mild spring, or in an ordinary season, if fed high throughout the winter with corn, and on the commencement of the breeding season on boiled barley, malt, fresh grains, and fine pollard mixed up with

Food and water should be placed near to her, for she sits closely. She ought to leave her nest daily and take a bath in a neighboring pond. The gander is very attentive, and sits by her and is vigilant and daring in her defense. When her eggs are placed under a common hen they should be sprinkled with water daily or every other day, for the moisture of the goose's breast is beneficial to them.

She should be cooped for a few days on a dry grass-plot or meadow, with grain and water by her, of which the goslings will eat; and they should also be supplied with chopped cabbage or beet leaves, or other green food. They must have a dry bed under cover and be protected from rats. Their only dangers are heavy rains, damp floors, and vermin; and they require but little care for the first fortnight; while the old birds are singularly free from maladies of all kinds common to poultry. When a fortnight old they may be allowed to go abroad with their mother and frequent the pond. For the first range a convenient field containing water is to be preferred to an extensive common. After harvest the flock should have the run of the stubble fields to glean, which will keep them in fine condition until fattening time. In fattening give oats and barley ground together, and finish with barley meal, just stiff enough so it will crumble. Meal and skimmed milk are excellent for fattening geese. If Indian corn is used exclusively the geese are apt to be very fat inside and the flesh oily. Steamed potatoes, with four quarts of ground buckwheat or oats to the bushel, mashed up with the potatoes and given warm, will render geese, cooped in a dark place, fat enough in three weeks. The French method of fattening consists in plucking the feathers from under the belly; in giving them abundance of food and drink, and in cooping them up more closely than is practiced with common fowls; cleanliness and quiet being, above all, indispensable. If killed immediately after they have spent some hours in the water they pluck more easily, and this should be remembered when they are plucked alive.

Our common geese cross freely with the Bremen and the Toulouse, the first cross yielding birds nearly or quite as large as either parent, but the results of the cross rapidly degenerate by breeding among themselves. To keep up the size, the cross birds should be bred to one of the larger geese. The cross between the Bremen and the Toulouse is

even larger than either parent, but deteriorates by breeding-in. The time of incubation of these three varieties is from twenty-eight to thirty days.

DISABILITIES OF GESE.

Cold foggy weather is most unfavorable to young geese, and they are particularly subject to diarrhœa and to giddiness. For the first hot wine, in which acorns or oak bark has been steeped, may be given, and for the second bleed with a large needle in the vein which lies in the separation of the claws. If the goslings are found with their wings hanging down and shaking their heads it is probably from insects in the ears or nostrils. To relieve them feed in a vessel of water so deep that the goslings must completely immerse the head.

SECTION V.—DOMESTIC DUCKS.

There are many varieties of ducks, but those of value to the farmer may be summed up in three varieties—the Mallard or common duck, the Rouen a similar duck, but larger, and the Aylesbury, a pure white duck. All the ducks are prolific layers, often going to 100 eggs, but they require watching, as they are apt to drop their eggs anywhere about the run.

The Rouen duck is the largest of any of the varieties and among the most hardy, decidedly as hardy as our common duck, and much more so than the Aylesbury. The Rouen duck closely resembles the wild Mallard. These ducks have broad, clumsily-built bodies, and when highly fattened they are very ungainly in their movements. They are remarkably quiet, easily fattened, and are most excellent layers of very large eggs, and have no equal for the table in the domestic family of ducks. The adult not unfrequently reaches from twelve to fifteen pounds per pair. See page 349.

BLACK CAYUGA DUCK.

The Black Cayuga duck is black with a white collar on the neck, or white flecks on the neck and breast—rarely black without white, and as the white seems inclined to increase, we usually select them nearly or quite black for breeding. The duck has a faint green tint on the head, neck and wings. The drakes usually show more white markings than ducks, and the green tint on head and neck is more strongly marked. When well fed the duck begins to lay about April, and usually gives an egg every day until eighty or ninety are laid, when she will make her nest and sit, if allowed; if not, she will gener-

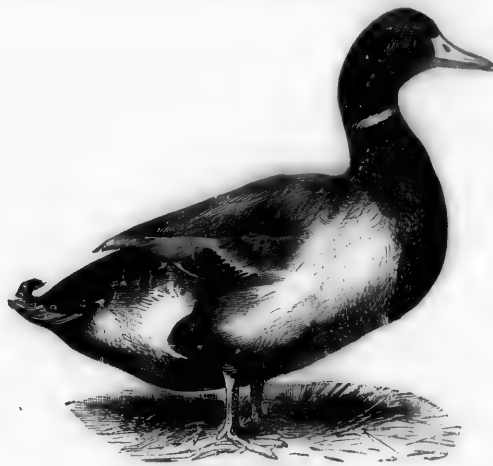
ally lay a litter in September. The Cayuga ducks are hardy, of good size, and for the table are superior to other ducks; the flesh quite dark and highly flavored. If well fed they become very fat; can be readily made so fat that they can not raise themselves from the ground by their wings; twelve pounds to fourteen pounds to the pair would be a good average weight.

AYLESBURY DUCK.

The Aylesbury is the largest, except the White Musk, and by far the best white duck. It is distinguished by its large size, its cream-white plumage,

SECTION VI.—MANAGEMENT OF DUCKS.

Ducks begin laying very early, and the earlier they are hatched the better; like geese, late broods are unprofitable. They usually lay fifty or sixty eggs, and have been known to produce 250. They require constant watching when beginning to lay, for they drop their eggs everywhere but in the nest made for them, but as they generally lay in the night, or early in the morning, when in perfect health, they should therefore be kept in every morning till they have laid. One of the surest signs of indisposition among them is irregularity in laying.



Rouen Duck, Male.

and its characteristic light yellow or cream-colored bill and orange legs. When well bred adult Aylesbury ducks weigh from eight to ten pounds per pair, while the best specimens will reach twelve. This duck takes its name from the town of that name, where it has long been bred with great care. The Aylesbury is a prolific layer, it being not unusual for the duck to lay more than one hundred eggs, and in some instances more than one hundred and fifty, in a single season. The average weight of their eggs is about three ounces. Early-hatched birds sometimes lay in the fall. It is quiet and easily fattened, and fine for the table, its only drawback being that it is somewhat tender. (See page 350.)

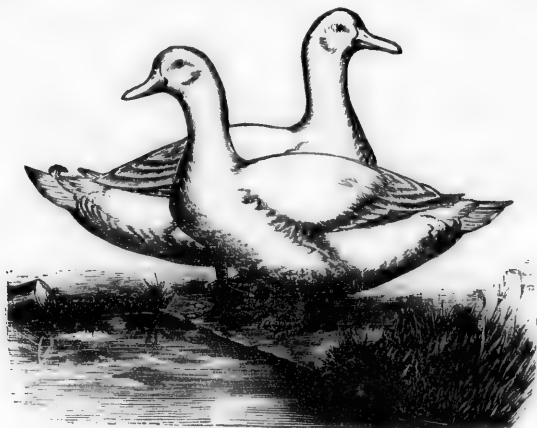
A hen is often made to hatch ducklings, being considered a better nurse than a duck, which is apt to take them while too young to the pond, dragging them under banks in search of food, and generally leaving half of them in the water unable to get out; and if the fly or the gnat is on the water, she will stay there until after dark, and lose part of her brood. If the duck is a good sitter, it is best to let her hatch her own eggs, taking care to keep her and them from the water till they are strong. The nest should be on the ground and in a damp place. Choose the freshest eggs, and place from nine to eleven under her. Feed her morning and evening while sitting, and place food and water within her

reach. The duck always covers her eggs upon leaving them, and loose straw should be placed near the house for that purpose.

They are hatched in thirty days. They may generally be left with their mother upon the nest for her own time. When she moves coop her on the short grass if fine weather, or under shelter if otherwise, for a week or ten days, when they may be allowed to swim for half an hour at a time. When hatched they require constant feeding. A little curd, bread-crumbs and meal, mixed with chopped green food, is the best food when first hatched. Boiled cold oat-

ground will suffice for the first week or ten days, and this rule is more especially to be adhered to when they are under the care of a common hen, which cannot follow them into the pond, and the calls of which when there they pay little or no regard to. Rats, weasels, pike and eels are formidable foes to ducklings.

A troop of ducks will do good service to a kitchen garden in the summer or autumn, when they can do no mischief by devouring delicate salads and young sprouting vegetables. They will search industriously for snails, slugs, woodlice, and millipedes and other



Aylesbury Ducks.

meal porridge is the best food for ducklings for the first ten days; afterward barley meal and oats, with plenty of green food. Never give them hard water to drink, but that from a pond. Ducklings are easily reared, soon able to shift for themselves and to pick up worms, slugs and insects, and can be cooped together in numbers at night if protected from rats.

Ducklings should not be allowed to go on the water till feathers have supplied the place of their early down, for the latter will get saturated with the water while the former throws off the wet. Though the young ducklings take early to the water, it is better that they should gain a little strength before they be allowed to venture into ponds or rivers; a shallow vessel of water filled to the brim and sunk in the

insects, and gobble them up eagerly, getting positively fat on slugs and snails. Strawberries, of which they are very fond, must be protected from them.

In fattening for market the same food may be given as recommended for geese. Boiled potatoes and buckwheat meal is excellent, and if plenty of green celery leaves is mixed with the food the flesh will have the flavor of canvas-back ducks, for this flavor is imparted by the wild ducks feeding upon a species of wild celery found along the shores of Chesapeake Bay and some marshes of the West.

But, as in the fattening of all other fowls, when they are fat they must be sold, else they will quickly lose condition.

CHAPTER V.

DISEASES OF POULTRY.

As a rule it is more economical to kill at once rather than attempt to cure common fowls showing symptoms of any troublesome disease, and so save trouble, loss of their carcasses, and the risk of infection. But if the fowls are favorites, or valuable, it may be desirable to use every means of cure.

See to a sick fowl at once; prompt attention may prevent serious illness and loss of the bird. When a fowl's plumage is seen to be bristled up and disordered, and its wings hanging or dragging, it should be at once removed from the others and looked to. Pale and livid combs are as certain a sign of bad health in fowls as the paleness or lividness of the lips is in human beings. Every large establishment should have a warm, properly ventilated and well-lighted house, comfortably littered down with clean straw, to be used as a hospital, and every fowl should be removed to it upon showing any symptoms of illness, even if the disease is not infectious, for sick fowls are often pecked at, ill-treated and disliked by their healthy companions. Bear in mind that prevention is better than cure, and that proper management and housing, good feeding, pure water and plenty of green food, cleanliness and exercise, will prevent all, or nearly all, these diseases.

APOPLEXY.

Apoplexy arises from over-feeding and can seldom be treated in time to be of service. The only remedy is bleeding, by opening the large vein under the wing, and pouring cold water on the head for a few minutes. Open the vein with a lancet, or if that is not at hand, with a sharp-pointed penknife; make the incision lengthways, not across, and press the vein with your thumb between the opening and the body, when the blood will flow. If the fowl should recover feed it on soft, low food for a few days and keep it quiet. It occurs most often in laying hens, which frequently die on the nest while ejecting the egg; and is frequently caused by too much of very stimulating food, such as hempseed, or improper diet of greaves, and also by giving too much of wheat or rye meal or other heavy food.

CROP BOUND.

Hard crop, or being crop-bound, is caused by too much food, especially of hard grain, being taken into the crop, so that it cannot be softened by maceration, and is therefore unable to be passed into the

stomach. Although the bird has thus too large a supply of food in its crop, the stomach becomes empty, and the fowl eats still more food. Sometimes a fowl swallows a bone that is too large to pass into the stomach, and being kept in the crop forms a kernel, around which fibrous and other hard materials collect. Pour plenty of warm water down the throat, and loosen the food till it is soft. Then give a tablespoonful of castor-oil, or about as much jalap as will lie on a shilling, mixed in butter; make a pill of it, and slide it into the crop. The fowl may be well in the morning. If the crop still remain hard after this, an operation is the only remedy. The feathers should be picked off the crop in a straight line down the middle and the crop opened with a knife. Generally speaking, the crop will be found full of grass or hay that has formed a ball or some inconveniently-shaped substance. When the offense has been removed the crop should be washed out with warm water. It should then be sewn up with coarse thread and the suture rubbed with grease. Afterward the outer skin should be served the same. The crop and skin must not be sewed together. For three or four days the patient should have only gruel; no hard food for a fortnight. The slit should be made in the upper part of the crop, and just large enough to admit a blunt instrument, with which you must gently remove the hardened mass.

DIARRHŒA.

Diarrhœa is caused by exposure to much cold and wet, reaction after constipation from having had too little green food, unwholesome food and dirt. Feed on warm barley meal, or oatmeal mashed with a little warm ale, and some but not very much green food, and give five grains of powdered chalk, one grain of opium and one grain of powdered ipecacuanha twice a day till the looseness is checked. Boiled rice, with a little chalk and cayenne pepper mixed, will also check the complaint. When the evacuations are colored with blood the diarrhœa has become dysentery, and cure is very doubtful.

GAPES.

A frequent yawning or gaping is caused by worms in the windpipe, which may be removed by introducing a feather, stripped to within an inch of the point into the windpipe, turning it round quickly, and then drawing it out, when the parasites will be found adhering with slime upon it; but if this be not quickly and skillfully done, and with some knowl-

edge of the anatomy of the parts touched, the bird may be killed instead of cured. Another remedy is to put the fowl into a box, placing in it at the same time a sponge dipped in spirits of turpentine on a metal dish containing boiling water, and repeating this for three or four days. Some persons recommend, as a certain cure in a few days, half a teaspoonful of spirits of turpentine mixed with a handful of grain, giving that quantity to two dozen of chickens each day. A pinch of salt put as far back into the mouth as possible is also said to be effectual.

LEG WEAKNESS.

Leg weakness, shown by the bird resting on the first joint, is generally caused by the size and weight of the body being too great for the strength of the legs; and this being entirely the result of weakness, the remedy is to give strength by tonics and more nourishing food. The quality should be improved, but the quantity must not be increased, as the disease has been caused by over-feeding having produced too much weight for the strength of the eggs. Frequent bathing in cold water is very beneficial. This is best effected by tying a towel round the fowl, and suspending it over a pail of water, with the legs only immersed.

LOSS OF FEATHERS.

Loss of feathers is almost always caused by want of green food, or dustheap for cleansing. Let the fowls have both, and remove them to a grass run if possible. But nothing will restore the feathers till the next moult. Fowls, when too closely housed or not well supplied with green food and lime, sometimes eat each other's feathers, destroying the plumage till the next moult. In such cases green food and mortar rubbish should be supplied, exercise allowed, the injured fowl should be removed to a separate place, and the pecked parts rubbed over with sulphur ointment. Cut or broken feathers should be pulled out at once.

PIP, OR TONGUE SCALE.

This, a dry scale on the tongue, is not a disease, but the symptom of some disease, being only analogous to "a foul tongue" in human beings. Do not scrape the tongue, nor cut off the tip, but cure the roup, diarrhoea, bad digestion, gapes, or whatever the disease may be, and the pip will disappear.

Roup is caused by exposure to excessive wet or very cold winds. It begins with a slight hoarseness and catching of the breath as if from cold, and ter-

minates in an offensive discharge from the nostrils, froth in the corners of the eyes, and swollen lids. It is very contagious. Separate the fowl from the others and keep it warm. Give from half to one tablespoonful of castor oil, according to the size of the fowl; wash its head once or twice daily with tepid water, feed it with meal, mixed with hot ale instead of water, and plenty of green food. Mr. Wright advises half a grain of cayenne pepper with half a grain of powdered allspice in a bolus of the meal, to be given daily. Mr. Tegetmeier recommends one grain of sulphate of copper daily.

THRUSH.

This may be cured by washing the tongue and mouth with borax dissolved in tincture of myrrh and water.

PARALYSIS.

Paralysis generally affects the legs and renders the fowl unable to move. It is chiefly caused by over-stimulating food. There is no known remedy for this disease, and the fowl seldom, if ever, recovers. Although chiefly affecting the legs of fowls, it is quite a different disease from leg weakness.

VERTIGO.

Vertigo results from too great a flow of blood to the head, and is generally caused by over-feeding. Pouring cold water upon the fowl's head, or holding it under a tap for a few minutes, will check this complaint, and the bird should then be purged by a dose of castor-oil or six grains of jalap.

MOULTING.

All birds, but especially old fowls, require more warmth and more nourishing diet during this drain upon their system, and should roost in a warm, sheltered and properly ventilated house, free from all draught. Do not let them out early in the morning, if the weather is chilly, but feed them under cover, and give them every morning warm, soft food, such as bread and ale, oatmeal and milk, potatoes mashed up in pot-liquor, with a little pepper and a little boiled meat, as liver, etc., cut small and a little hempseed with their grain at night. Give them in their water one ounce of sulphate of iron and one drachm of sulphuric acid dissolved in one quart of water; a teaspoonful of the mixture is to be added to each pint of drinking water. This chalybeate is an excellent tonic for weakly young chickens and young birds that are disposed to outgrow their strength.

Principles of Stock Breeding.

CHAPTER I.

KNOW WHAT YOU BREED FOR.

SECTION I.—BREEDING FOR FAST WORK.

The horse alone, of farm animals, is bred for fast work. The mule and ox alone for labor. But the horse is bred not only for fast work but also for slow draft, or, as it is called, labor. It would seem to many persons who had not looked into the question carefully, that except in the greater weight of the animal the frame might be alike whatever the work to be done. It would be impossible, hence it is unnecessary to go into the full detail of why an animal should be differently constituted for fast and slow work. An outline will suffice.

WEIGHT-BEARING.

A bridge that is to sustain a heavy weight is arched. In pulling a chain straight suspended between two points, it is pulled up to a true horizontal position. Hence it follows that the animal intended to carry weight on its back must not be hollow or sway-backed. The blood horse, the greatest weight-bearing animal for its size known, is powerfully constituted as to the spinal column. Small mules gotten by blood horses are also well known for their sure-footed qualities, and great weight-carrying qualities in mountain passes. The slow, lumbering draft horse, instead of having his spine arched or level, is more or less hollow-backed. A well-formed man is "hollow-backed," but when a great weight is to be borne he stoops his shoulders under the burthen and thus forms an arch to support the load.

The mule has great flexibility of limb. The blood horse has this flexibility of limb in an eminent degree. In pulling a load where the entire strength of the animal is required, they place themselves in a position to bring the belly as close to the ground as

possible, thus bringing the spine in as direct a line with the draft as may be. Thus the oblique shoulder is brought into a line with the collar. The head and neck are thrown forward and the hind limbs are excessively bent, and the load lies in the direction of draft corresponding with the muscular development of the body, and especially so in relation to the spine. The same is true with the mule. For their weight both the blood horse and the mule are therefore better adapted for both weight-carrying and draft than any other animal.

The horse or mule, unless really sway-backed, will move a greater load with a proper proportion of weight on his back than without, and roach-backed horses, unless deformed, are notorious carriers of weight. Yet no low-withered roach-backed horse should be selected for fast work, and certainly no sway-backed horse should. High withers, a rather light and high crest, with strong loin and muscular rump, will give an appearance of "sway-back" to those who do not understand the anatomy of the horse.

THE NORMAL SPINE.

The normal spine is straight, or nearly so, the appearance being only from the curves formed by the withers and rump. This may be seen from an examination of the skeleton of the horse in the first part of this work. High withers and a high rump with correspondingly low top bones of the spine between, will intensify the appearance of a sway-back in the horse, when in reality the spine itself may be normally straight.

SECTION II.—BREEDING FOR LABOR.

The draft-horse is not so high in the withers in proportion to his weight as the blood horse, his shoulders are more upright, he stands straighter on the fetlocks, the bones are larger and less fine, and

the articulations of the bones generally are closer. In fact taking the racing horse as the model, the gradations of excessive fineness in this animal are modified, all the way down through the trotter, roadster, Cleveland Bay, Percheron, Clydesdale, and Shire horse, until we at last come to the coarse-bred, lumbering mongrel, which, although he may have bulk, really lacks courage, intelligence, and activity. All these breeds are distinctive, and all of them, except the trotting horse, have been bred distinctively for generations with a special view to the particular uses required of them.

BREEDING FOR THE ROAD.

The special breeding of horses with a view to fast work in the trotting ring, extends back but a few generations, yet the increase of speed, and hereditary instinct to the trotting gait and disinclination to break, has been wonderfully developed. Among draft horses, great style, compactness, activity in trotting and trueness to color, have also been developed in a comparatively short space of time. In the Percheron, Clydesdale and Shire horse, their special qualifications and appearance have become quite as fixed as in those of the blood horse, and the color lines very much so as to uniformity. Hence the practical man in the breeding of animals of draft, will find it profitable to employ these as sires, rather than to go outside of any distinct breed.

HORSES FOR FAST WORK.

In the case of horses for fast work, the nearer the animal is thoroughbred the more sure one is to get a winner. The modifications produced by the use of standard-bred sires of any of the draft breeds, upon large rooney mares, of mixed blood, will give superior horses, but in this, as in all other lines of breeding, unless extreme care in selection is constantly practiced, the progeny will be more inclined to breed back to the imperfections of the sire and dam, than to breed to the superior points.

SECTION III.—BREEDING FOR FLESH.

Coming now to the breeding of animals for their flesh, the same principles heretofore enunciated will apply. All these it will not be necessary to repeat. Whatever you breed for breed to a type. The beef animal must be compact, muscular, round-barreled, fine-boned, with the development in those parts which produce the best flesh as strong as possible without compromising the general symmetry of the animal.

The Hereford, Shorthorn, and Polled Angus may be accepted as types of great excellence in beef points alone. A more composite animal will be found in the Sussex, the Red Poll and the Galloway.

The Devon is the most bloodlike of the bovine race, combining great muscular activity with eminent style, excellent flesh and ability to forage on short pasture. Accept any of these as the model, according to the circumstances in the case, and breed as near to the standard as possible by the use of sires of pure blood.

For mutton you cannot go astray either with the Southdown, Shropshire or Hampshire. Among swine the Berkshire, Poland China, and Duroc are excellently adapted to the west, and for an exceedingly fine hog for special feeding, the Yorkshire will be indicated.

SECTION IV.—BREEDING FOR MILK.

In breeding for milk special characteristics, of which the Ayrshire is a modification, must, again, be sought. The time has long since past when great excellence is to be sought in many directions in a single animal. There never was any truth in the assertion that great milking qualities and eminent beef points could be combined in a single breed. They are antagonistic to each other, and have never really been held as true by intelligent breeders. Inasmuch as you develop one you decrease the other. Neither can you expect great muscular activity except at the expense of beef. The Devon has style, great muscular power, speed and bottom. Since the general introduction of horses and mules for farm work, Devons have been less and less sought. They have gradually been developed of late years in size and early maturity, but they have equally departed from the characteristics of fifty years ago, when the labor of cattle was generally sought on the farm.

SELECTING THE TYPE.

Let us see then what we should select as the type of a first-class standard for milk. The animal must of course be fine. Her head should be long, rather than short, and with a large muzzle, clear, placid eye, and rather small horns, the neck rather thin, and looking at the cow from before she should be wedge-shaped. That is, there must be an appearance of a gradual enlargement as we proceed back. She must be rather flat-sided, because very deep, and for another reason, the hind parts especially must be

great to support the necessary udder to hold the milk she is expected to carry.

Dr. Loring, the learned commissioner of agriculture, who unites a scientific and practical knowledge of agriculture in an eminent degree, in a discussion before the Massachusetts Agricultural Society, in 1875, describes the Ayrshire (than which there are no better models for general milking qualifications, except capacity to eat) as follows:

She should have that structure of head which indicates a contented, placid disposition and a powerful constitution; a calm and steady eye; a face that is as expressive as a cow's face can be; as much of an intelligent look as an animal of that description can have; a horn not too large at the base, but large enough to indicate that there is a good constitution there; a head wide between the eyes and pretty high above the eyes to the root of the horns. I think a cow that has a broad base to her head the best. And if she has a large luxurious mouth that looks as if she were made for business, and can fill her stomach rapidly, so she can lie down and digest and repose, she will be all the better fitted for the business of the dairy. I would have a cow's neck small enough to be graceful, but not too small, not a ewe neck—that is not necessary—but gracefully, delicately and elegantly set on, without a waste muscle in it, but with muscle enough to make it a strong, vigorous and powerful part of the animal's body. * * * * The shoulder of a good dairy cow should be a little loose, with the blades not rising above the backbone, with strong, powerful muscles, and a good substantial base, with a fore-quarter under it as straight as plumb-line. Crooked-legged, knock-kneed cattle are never graceful, and seldom profitable. The legs should be strong and well defined, and the cords and muscles should stand out clean and prominent. The milk veins should indicate a good superficial vascular system, which means simply this: It is an organization in which the superficial circulation of the blood indicates that what are called the secretory organs are active in the interior. The next sign of a good cow is an open, bony structure; not a coarse or loose-fibered, bony structure, but a bony structure that is so articulated or hung together that there is elasticity and ease of motion about it. Now, where are you going to find the indicative point that will tell this story? Put your finger into the point of the shoulder

and see if the cow has a cup-like cavity there. If she has, ten chances to one she will be a good milker; but if not, if her shoulder is hard and compact, even if she is milking well to-day, she will be likely to fail to-morrow.

You next come to the ribs. Upon a good chest-development depends almost everything else in a dairy-cow. She must have a finely-shaped chine, and the spring of her ribs, from the spine down through her heart, must indicate that she has a strong circulation; but you do not want her brisket as deep as a steer's, or like a Shorthorn bullock; you want the shape I speak of, and you want it with a certain delicacy of organization which indicates that the circulatory system is a strong one and that neither the heart nor the lungs are impaired. But go back to the ribs. You want a rib, not round, like your finger, but flat and wide. When you put your hand on it, it should feel as flat as a lath; and if you can get at the edge, you should find the edge sharp, and not a round bone, like the rib of swine. A round rib will answer for a beef animal, but not for a good dairy-cow. Her backbone, moreover, should be open and loose, so that if you run your hand along it you will feel those little cup-like cavities. Let her hips be strong, not too wide, and her hind-quarters upright, substantial, vigorous. Let her have a long hind foot. I never saw a short-toed cow in my life that would perform the work of the dairy well. A long hind foot and a good, broad, ample forefoot. Then if, in addition to all this, you can get a hide that is elastic and soft, covered with a warm substantial coat of hair, with a good milk-vein and an udder which is packed up well between the thighs, and so organized that there is no danger of inflammation, there you have got a cow that will produce all the milk you ought reasonably to ask, and which, when she has completed her dairy-work, can be so fattened as to produce in an economical way your 550 pounds of as good beef as can be fed on a mountain pasture or in a stall.

SECTION V. — BREEDING FOR WOOL.

There is little to say on this subject outside the facts already stated in relation to feeding and selection in preserving a fixity of type, in which the rule will follow in all farm animals. The general farmer will select the breed best adapted to his soil and situation. A careful inquiry among his friends and neighbors will soon enable him to come to a conclusion as to

what variety of wool, or of wool and mutton combined, is most profitable for his climate, soil and situation.

One principle, however, may be taken as being constant. The large mutton breeds and long-wooled sheep will not give profit in open ranges when the flocks are large and obliged to subsist, during drouths and in winter, principally on the natural herbs of the country. The long wools and the special mutton breeds are animals to which constant good feeding is necessary, and there is no breed so well adapted to great flocks and to forage for themselves, among the superior breeds, as the American Merino. Nevertheless, no animal that is subject to a feast at one time and famine at another, to plenty in summer and semi-starvation in winter, ever produced wool of a uniform quality.

So, sheep exposed to storms in the winter will show a weak place in the wool for every season of shrinkage in flesh. Therefore it may be taken as an axiom that only liberal feeding, winter and summer, will produce wool of a uniform quality, length and texture, whatever the breed. The farmer, therefore, breeding grades need not hope for success unless he make up his mind that success will be in just proportion to the careful feeding, general attention and shelter from storms given.

CONCLUSIONS.

It will be seen, therefore, notwithstanding that general principles may be given, valuable as a study, each and every breeder carefully examines for himself the special requirements of which he wishes to avail himself. It will bear repeating, he must know what he is breeding for, and breed directly to that end and no other. If for speed in horses, he must select stallions of great courage, fine bone and high muscular development. If for draft, heavy, compact, large but strong boned animals, with plenty of belly. For carriage, large, stylish, rangy, high stepping and rather short gaited animals. For beef, large, long, square bodied stock, with thick shoulders, broad loins and broad, deep thighs. For milk, long heads, somewhat thin necks, fine shoulders, the body gradually swelling back to the hips, and with thighs rather thin, but excessively deep, great digestive capacity and, of course, ample belly. In swine breeding, early maturity, with plenty of lean meat on the hams and shoulders, and the belly (bacon pieces) well streaked with lean, and to make

a weight not over three hundred pounds. If wool is desired, breeds must be sought giving the desired quality, and those especially that flock well, the Merinos, for instance, when large flocks are to be kept together.—It is well known that the mutton breeds and the long woolled breeds cannot be successfully kept in large flocks, and for this reason we have designated the Merinos, for this breed does flock well. If both mutton and wool are sought, some variety of the Downs will be indicated. But if great length of combing wool with large size is wanted, Cotswolds or Leicesters may be chosen.

CHAPTER II.

SCIENCE AND ART IN BREEDING.

SECTION I.—SCIENCE IN BREEDING.

The preceding chapters have related distinctly to the absolute necessity of knowing exactly what you are breeding for, whether for milk, labor, flesh, fiber or fleece, or for a combination of two of these qualities.

Science in breeding must also be carefully considered, and this for the reason that, upon the practical application of scientific effort to the work in hand, rests success or failure, in any department of agriculture.

Thinking men are not afraid of the word science nowadays, as they used to be, when the general comprehension of it was supposed to be abstruse facts, brought together, of but little use to the practical man. We now understand the term to mean the bringing together of absolute facts which may form a law correct and undeviating. There is not anything in nature which relies on chance; natural things are governed by fixed immutable laws, and people are learning, day by day, that science is simply the correct establishment of that which is true. Certain knowledge! Hence, science is an assemblage of general principles. Art relates to the practice. The theory of agriculture is science; its practice is art. This is all there is to it, and hence, again, as Playfair wrote, "A principle in science is a rule in art."

SECTION II.—PRINCIPLES IN BREEDING.

The principles of breeding must be a study, more or less deep, according to the particular use to which it is to be applied. Some knowledge of the laws of heredity, variation, early development, fecundity, correlation, anatomy, physiology, and the assimila-

tion of foods are among the important things to be known by every breeder. The great breeders of the world have known much practically of these things. It will simply be our aim to present facts and object lessons, by which the breeder may easily make himself acquainted with the principles underlying his art, and this without going into an abstruse study of the sciences underlying. The practical application of science does not make it necessary, for the breeders' art lies as much in a study by the eye and touch as in the deep study of principles. A lifetime would be required to get the knowledge, unaided by what others know and have known. With this aid, plainly stated and correctly delineated, it is easy; for it is but to profit by the experience of a great number of persons, laboriously brought together, and when possible, tabulated for review. This, so far as it may go, is science in breeding.

SECTION III.—THE BREEDER'S ART.

The art of breeding consists in properly applying correct rules to practice. As the study of original laws allows the scientific man to discover still other scientific facts and reduce them to principles, so the study of certain rules enables the worker in any branch of industry to apply the principles relating to his practical branch of industry most economically.

There never was any great invention discovered by chance. There never was an invention, even of the most simple character, perfected except through careful study. Steam had hissed from the spouts of kettles from time immemorial; it required the reflective mind of a Watt to connect one scientific fact with another and apply the action of steam successfully as a motive power. Chandeliers and lamps had swung since the time of the era of Chinese civilization, and yet Galileo alone could realize that swinging in circles would solve the true economy of the motion of worlds. The idea of the rotundity of the earth led Columbus to understand that sailing in one constant direction would lead him certainly back to the starting point, and thus "a new world was discovered."

EARLY SCIENTIFIC BREEDERS.

Bakewell, the Collings, Tompkins, Davey, and many other eminent breeders, later, but acted upon true scientific principles in the improvement of the long horns, sheep, short-horns, Herefords and Devons. These minds relied upon the law that "like produces like," and that the selection of the best will give

"survival of the fittest." Yet these were scientific truths, and the present noble and useful breeds of horses, cattle, sheep, and swine were steadily thereafter improved. Will the masses of working farmers refuse to profit by their labors because a certain class of pedantic schoolmasters, even to-day, argue that science should not be used in the common every day affairs of life? It is too late. Scientific endeavor—that is, correct principles and correct rules—has invaded the domain of practical art everywhere; hence the vast impetus in every department of industry within the last fifty years, and especially so within the last twenty years.

Shall the farmer alone refuse to profit thereby? The few never have. Many now firmly adhere to what may fairly be called correct principles in practical art.

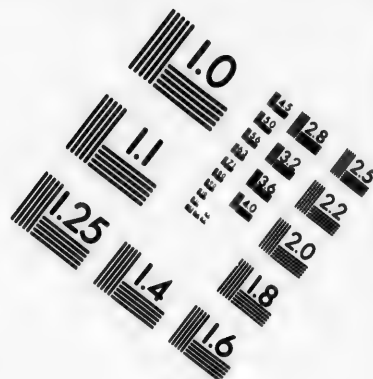
SECTION IV.—USING MEANS TO AN END.

The policy of working without fixed purpose never accomplished any good end. The farmer who spreads his labors over all the domain of agriculture never succeeds well in any. A diversity of crops is necessary, but the farmer must confine his efforts to those which his land will best carry. Climate, soil, situation, drainage, all are important considerations in their relation, to be studied. Varieties of the species employed, as adapted to the conditions of soil, climate, etc., are no less important.

Thus the man who cultivates the best varieties in the best manner, and with a definite idea of what the outcome should be, makes the most money. He does not raise half a dozen varieties of wheat, oats, barley and corn, mixed up in inextricable confusion. He does not seed his land with the same quality of grain designed for general sale. He selects the best, and only those varieties of wheat, oats, barley, corn, etc., that do best on his soil.

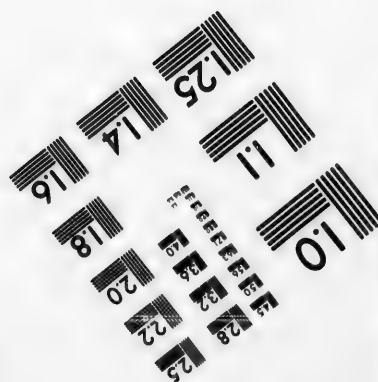
If he has a market orchard he does not fill it indiscriminately with the hundreds of varieties of apples, peaches, cherries, plums, pears and other fruits of the great commercial nurseries. He selects but few. If very practical, a very few varieties of a species, and such as will follow each other in season. In replanting an orchard he does so only from those varieties that have produced the best out of the few originally planted. In the farm crops varieties are confined very properly to a single one of a species—one of wheat, the same of oats, flax, barley, and of other seeds; generally one only





A resolution test chart featuring various patterns of vertical and horizontal lines. The patterns are arranged in a grid-like fashion. Numerical labels are placed next to the patterns, indicating resolution values. The labels include 1.0, 1.1, 1.25, 1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.8, 3.2, 3.6, 4.0, 4.5, 5.0, 5.6, 6.3, 7.1, 8.0, 9.0, 10, and 11. The patterns consist of groups of three vertical lines and groups of three horizontal lines, with the lines becoming progressively thinner and closer together as the numerical value increases.

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DO NOT MULTIPLY BREEDS.

In the breeding of animals this rule must be an imperative one. If the farmer be both a beef and milk producer, the rule may be deviated from. A breed for milk and one for butter may be chosen; but on the average farm this will not bring success. He must either become a beef producer or a milk producer. Above all, he should never allow himself to be carried away with the idea that he can combine great excellence in both directions in the same animal. It never has been done, and never will be done. An animal can only be *superior in one direction*.

In this day of eminent superiority of breeds in a single direction it would be the folly of supreme ignorance to step backward into the dark and imagine he can produce what never has been done and never will be done—produce an animal at the same time superior in milk, beef and labor.

Any cow will of course make beef when fed for beef, but aptitude for fattening is as certainly in antagonism to the production of milk, as the production of a large quantity of milk is against the most economical production of beef. It can be demonstrated physiologically. The two animals must be differently constituted. A high beef-making form is distinct from a high milking form, and *vice versa*.

SECTION V.—SELECTION OF MALES.

The breeders' art has brought three breeds of cattle—two of them horned and one polled—to wonderful perfection as beef-makers. Four breeds contest the palm as milk producers. Other horned and polled breeds have special excellencies, as, for instance, the Devons and Sussex, as working oxen and beef-makers combined; and others, again, as the Galloway, for combined beef and milking qualities.

Would it be policy to start to build up a breed from the mixed blood of a country? Would it not be better to use as foundation stock the superior animals already extant?

There is no question about it. Neither is there any question but that it is the sensible plan in the improvement of the native stock of mixed blood of the country to use such well-bred sires of pure or thoroughbred stock as possess the characteristics in the best degree for the purpose intended. And let that purpose be definite either for beef or milk, mutton, wool, pork, poultry or eggs.

COLLATERAL QUALIFICATIONS.

Even collateral qualifications must enter. On hilly or broken lands of scant pasture, or in cold climates, later maturity and constitutional ability to withstand climate must be accepted at the expense of early maturity. In dairying the question of butter, cheese, or both, must be considered in the selection of a breed. And yet, in all this, the general farmer is most interested in this single question. Why does the prepotent thoroughbred or pure sire exercise so much greater and constant influence on the mixed blood of a country than on the pure blood of another breed? That is, why is it better to breed grades than to cross two distinct breeds?

SECTION VI.—GRADES VS. CROSSES.

In relation to the breeding of grades from the mixed stock of a country by full-bred sires, what results? The full measure of pure blood is prepotent upon each integer of the mixed blood if it be made up of few or many mixed breeds, and they are individually lost in the vast preponderance of superior blood over any one of these integers. The fifty hundredths of pure blood in the progeny will have modified all the other integers prepotently into a harmonious whole, and the purer the blood on the side of the sire the more marked will be the influence.

But by purity of blood we do not mean that rare purity containing the greatest amount of the blood of some special sub-tribe, or variety of a breed, and possessing the constitutional merits of the specific breed itself. Certain animals, really worth many thousands of dollars as sires to certain other females bred in the same direct line, would not be available to the market breeder. He can produce the results wanted from sires of the same breed; nay, the same special strain, if need be, for an outlay of a few hundreds, and even as low as two hundred dollars, in the case of a bull.

A CASE IN POINT.

M. Malingie-Nouel, Director of the Agricultural School of La Charmoise, according to a translation for the *Journal of the Royal Agricultural Society*, relates,—and the one instance may be taken as conclusive, both from the care taken in the experiments, and the perfect authenticity of the relation. The fact that the animals were sheep does not detract from the principle as applied to other animals, except that from the greater prolificacy of sheep

the experiment could reach results more quickly. The quotation is as follows:

When an English ram of whatever breed is put to a French ewe, in which term I include the mongrel merinos, the lambs present the following results: Most of them resemble the mother more than the father; some show no trace of the father; a very few represent equally the features of both. Encouraged by the beauty of these last, one preserves carefully the ewe-lambs among them, and when they are old enough puts them to an English ram.

The products of the second cross, having seventy-five per cent of English blood, are generally more like the father than the mother, resembling him in shape and features. The fleece also has an English character.

The lambs thrive, wear a beautiful appearance, and complete the joy of the breeder. He thinks that he has achieved a new cross-breed insuring great improvement, and requiring thenceforth only careful selection to perpetuate by propagation among themselves the qualities which he has in view. But he has reckoned without his host. For no sooner are the lambs weaned, than their strength, their vigor, and their beauty, begin to decay as the heat of our summer increases. Instead of growing, they seem to dwindle; their square shapes shrink; they become stunted; and, on the threshold of life, put on the livery of old age.

A violent cold in the head completes their exhaustion. This is accompanied with a copious flow of slimy mucus from the nostrils, constant sneezing, and sometimes cough. At last the constitution gives way, or, if the animal lasts till autumn, the malady indeed ceases, but it remains stunted for life.

The time lost was the time of growth, and cannot be recovered, for Nature never goes backward. Henceforth he looks like a foreigner escaped from the mortal influence of an inhospitable climate, and remains inferior even to our native sheep, which at least have health and hardness in their favor. The experiment has sometimes been tried with English rams, or, in a third generation, and the symptoms above described have arisen even more strongly in proportion to the stronger admixture of English blood.

PREPOTENCY.

In relation to prepotency our authority, after pointing out some differences in English breeds of sheep, continues:

If you put a Leicester ram, a mixed New Kent (of Romney Marsh origin), or a Southdown that is not pure, to a pure ewe of any French race, very little English character is impressed on the offspring, never less than when the ewe is a pure merino. In this last case, it often happens that you can see no difference between lambs that are Leicester-merinos, Kent-merinos, or Southdown-merinos, and another lamb of the same age which is pure merino. In compensation, however, for this feeble influence of the English sire, the lambs of such first crosses have no more difficulty than French lambs in getting over the first summer. If, on the contrary, the same ewes are put to very pure rams of the Southdown or New Kent breed, the English character is more marked than in the former cases.

In both cases the offspring is reared; for lambs in which the English blood does not exceed one-half seem to be reared as easily as pure French lambs. But, then, since little improvement is obtained one is tempted to give a new dose of English blood—to put the Anglo-French ewes to English rams—whereupon the disasters described are sure to follow.

Prof. Malingie-Nouel then proceeds to describe some new and final experiments which eventuated in the production of the Charmoise breed of sheep, one which has retained its value in France, as related below, in which our authority states:

Inasmuch as one could not increase the purity and antiquity of the blood of the rams, one must diminish the resisting power, namely, the purity and antiquity of the ewes. With a view to this new experiment, one must procure English rams of the purest and most ancient race, and unite with them French ewes of modern breeds, or rather of mixed blood forming no distinct breed at all. It is easier than one might have supposed to combine these conditions.

On the one hand, I selected some of the finest rams of the New Kent breed, regenerated by Goord. On the other hand, we find in France many border countries lying between distinct breeds, in which districts it is easy to find flocks participating in the two neighboring races. Thus, on the borders of Berry and La Sologne, one meets with flocks originally sprung from a mixture of the two distinct races that are established in those two provinces. Among these, then, I chose such animals as seemed least defective, approaching, in fact, the nearest to, or

rather departing the least from, the form which I wished ultimately to produce. These I united with animals of another mixed breed, picking out the best I could find on the borders of La Beauce and Touraine, which blended the Tourangelle and native merino blood of those other two districts.

From this mixture was obtained an offspring combining the four races of Berry, Sologne, Touraine, and merino, without decided character, but possessing the advantage of being used to our climate and management, and bringing to bear on the new breed to be formed an influence almost annihilated by the multiplicity of its component elements.

Now, what happens when one puts such mixed-blood ewes to a pure New Kent ram?

One obtains a lamb containing fifty-hundredths of the purest and most ancient English blood, with twelve and a half hundredths of four different French races, which are individually lost in the preponderance of English blood, and disappear almost entirely, leaving the improving type in the ascendant. The influence, in fact, of this type was so decided and so predominant that all the lambs produced strikingly resembled each other, and even Englishmen took them for animals of their own country.

But what was still more decisive, when these young ewes and rams were put together, they produced lambs closely resembling themselves, without any marked return to the features of the old French races from which the grandmother ewes were derived. Some slight traces only might perhaps be detected here and there by an experienced eye. Even these, however, soon disappeared, such animals as showed them being carefully weeded out of the breeding flock.

Cases by scores might be cited, but why supplement proof, already absolute, by other proof?

SECTION VII.—ADAPTING A PURE BREED TO A COUNTRY.

Let us take sheep again to illustrate the point; and for the reason before mentioned, and the breed the American merino, now acknowledged as combining more excellencies than any other one breed of fine woolled sheep. The American merino is the result of careful selections from the progeny of five original families brought to America in the beginning of the century. In the two classes of American merinos the Paular is the type, in one, and the Infantado in the other family. In 1818 Mr. Atwood commenced the breeding of pure merinos from what was then

known as the Humphrey stock. Careful selection to a pre-established type and carefully good feeding and shelter were the means used. Mr. David Wadhams, of Connecticut, father of Mr. Carlton Wadhams, of Indiana, and Mr. Seth Wadhams, of Illinois, was early and prominently identified in breeding sheep from imported Spanish stock in New England as their sons were in the progeny in Illinois as early as 1848. To them and to Mr. Roswell Carter, who had large moneyed investments in merinos, is largely due the introduction of this valuable breed in the West.

MR. HAMMOND'S BREEDING.

About the same time Mr. Edwin Hammond, in Vermont, systematically commenced breeding, selecting his stock from the Atwood family of merinos. Other breeders later followed in the same careful line of breeding, resulting in the now world-famous American merinos, combining fineness and evenness of fiber, length of staple, thickness of wool, a loose skin, lying in "low, rounded, soft ridges over the body," offering no obstruction to the shears. These are the direct descendants of the incomparable Infantados of Spain.

THE PAULAR IMPROVEMENT.

The Paulars, the descendants of the original Paular importation, were the strain that came into the possession of Mr. Silas Rich, and from him descended to his son. They were marked by the same careful breeding, and constitute the smaller, or Paular, breed of American merinos. This latter branch of the American merino were built upon the mixed Lionese, or Jarvis, merinos. The Paular influence, however, largely predominating.

It is unnecessary to follow the subject farther. It should be conclusive as showing in breeding that violent departures from a type are as fatal to the continued integrity of a race, as careful selection and breeding to a type is conducive to prepotency, as it is to the perpetuation of valuable qualities in the highest degree.

But this fact still remains constant in the improvement of all stock, once the standard is reached there must be no idea entertained that the standard will remain intact without still further and constant care. If the effort to keep the standard intact be intermitted deterioration is sure to follow and the animals will retrograde. The reason is simple. Disabilities have not been entirely bred out. They

still remain in a degree but latent. Covered up but yet remaining. Absolute and stable perfection can only be approximately reached, and one good quality only at the expense of another. As soon as careful selection of sires and dams and high feeding is intermitted, these inferior qualities begin to shew and the further it proceeds, the more swiftly and intensely. Hence a variety once brought to great superiority, through a generation of care and attention, if succeeded by inattention to breeding points and lack of food, deteriorates far more quickly than it was bred up, and this from a constant law of nature. This is the law of compensation. In the breeding of superior animals the bones become dense and fine and the whole constitution partakes of this conservation. In this warmth, good care and high feeding play an important and economical part. The digestive organs may remain unimpaired, but high feeding naturally reduces the capacity of the stomach. Hence, if inferior food and inferior shelter follow want of capacity in selection, it will easily be seen that quick deterioration must surely follow.

CHAPTER III.

FOOD AND ALIMENTATION IN BREEDING.

SECTION I.—FOODS AND FOOD VALUES.

Only general principles can be touched upon here. The science of feeding is to provide such food as the animal requires as adapted to its nature, and of such diversity as will keep its appetite constant, and its digestion perfect. Hay, straw and other fodder crops are the basis of feeding. Grain is supplementary, to be used in such quantity as the price may warrant. In some sections it corresponds nearly in price per acre with hay. It will here be used more freely than in sections where, from long transportation, it is costly.

The breeding animal, however, must be fully fed, and with a variety, else in time it will tell in deterioration upon the progeny. No farm animal should be stinted in food. It is not profitable, least of all is it profitable in an animal carrying young or giving suck. The male will not have vigor if starved; the female cannot do justice to the fetus, and all young animals must be especially well nourished.

The season of copulation among wild animals is at the season when food is most plentiful, and strength of muscle is strong from constant running and fighting among males.

SELECTION OF BREEDING ANIMALS.

However careful the selection of breeding animals, failure will be sure unless exercise is constant enough to keep the muscle hard and the appetite perfect. Then a diversity of food will round out every part, and perfect young will be the result. In animals intended for labor the exercise must be severe enough to keep down accumulations of fat. In sheep the exercise is sufficient in the gathering of the daily food. In cattle less exercise is necessary, and in swine least of all. Yet exercise approaching that of animals in a wild state is necessary to strength of constitution, and here the breeder may take a lesson, to be applied to all animals that, through neglect in this respect, have had their constitutions impaired. In the horse the exercise should far exceed that taken in the wild state, and the feeding should be proportionally strong, since their work is exhausting. In the other animals the exercise is to be less than when wild, unless extra constitutional vigor is desired.

In the case of bulls this extra exercise may be at the end of the leading rope or in the yoke. With sheep and swine rather short but mixed pasture, but with special feeding at night. Attention to these facts will enable any breeder, while breeding his herd up, to keep their constitution unimpaired. Neglect in this direction is the chief cause of deficiency in constitution and general deterioration of the stock.

SECTION II.—ECONOMY IN FEEDING.

In the appendix to this volume will be found tables worthy of most careful study relating to foods and food values. It will, therefore, only be necessary here to state principles. For fast work the food must not only be varied, but concentrated in form. All animals of speed have comparatively small stomachs. They require food often. In the horse digestion is always going on, but fast work should never be given within an hour after eating, and then the food should not have been in sufficient quantity to fully distend the stomach. For breeding, it must be varied, rich and nutritious. The cost here is a secondary consideration. Hence, as a rule, the best stock, constitutionally and in regard to flesh and milk, is found in the districts where food is cheap.

VALUES OF FOOD MATERIALS.

As to food values they are fairly stated in the following table, prepared by Professor Tanner, of En-

gland, representing the composition of various materials used for food of animals, and their feeding value as demonstrated in practice:

Materials.	Composition.			Feeding value.	
	Non-nitrogenized matter.	Nitrogenized matter, per cent.	Water, per cent.	Pounds required to make one pound of food.	Per cent.
Barley.....	50	13	14.43	6	16.7
Oats.....	55.5	13.6	12.8	7	14.3
Beans.....	48.5	23.3	14.8	8	12.5
Peas.....	50	23.3	14.1	8	12.5
Linsed cake.....	35.52	28.56	8.6	5 to 6	16.7
Linsed cake and peas, equal parts.....	31.76	25.93	11.3	4½	22.2
Rape cake.....	11.3	33.7	6.8	6	16.7
Cotton cake.....	30.4	42.9	7.9	6	16.7
Clover hay.....	40	9.3	14	12	8.3
Swedes.....	8.474	1.44	89	150	0.66
Mangolds.....	8.19	1.81	86	150	0.66
Carrots.....	10	1.5	85	160	0.66

In actual application these estimates of value are modified by various considerations. Some of these are stated by Professor Voelcker as follows: 1st. The age of the animal; young animals, especially, requiring a large proportion of nitrogenized matter and bone-forming material. 2d. The kind of animal (the food best suited to horses is not always best for cows or sheep). 3d. The natural disposition or temper of the animal. 4th. The purpose for which the animal is kept—as whether for fattening, or for work, or for milk. The digestibility of the food, also, demands attention. Professor Voelcker states a few of the conditions affecting it: 1st. The kind of animal: cows more readily assimilating the nutriment of cut straw than horses. 2d. The amount and character of woody fiber contained in the food. 3d. The amount of flesh-forming substances. 4th. The bulk of the food. 5th. The form in which it is presented to the animal; whether cut or not cut, cooked or raw, etc.

SECTION III.—PERFECT FOODS.

A perfect food is that article, or a combination of articles, representing in a proper ratio an approximation of all the constituents required for the growth or the fattening of animals. These are of less moment to the breeder than the fatterer, except in locations where much food must be bought. In the west especially, where all grain is cheap, the diet is easily varied, so as to insure constitutional vigor in the

growth of the young animal or the fattening of the mature one. Nevertheless, something of this is necessary in a work intended for wide circulation. Grass, as found in pastures of mixed grasses, is a perfect food. That is, it contains all the constituents required for strictly herbivorous animals, and with a due quantity of moisture for perfect digestion in connection with the fluids poured out upon it by the secretions of the body. Hay, being of comparatively few varieties, contains the proportional average, not only in a less natural degree, but there is generally large loss in drying.

Tables in the appendix will show the approximations toward perfect foods in other farm products. Oats approach the nearest to a perfect food of any of the grains. And in practice it may be stated that equal weights of oats and corn ground together and given to the animal, in connection with half the quantity of hay naturally required, may be considered a perfect food for all growing animals in winter.

HAY AND GRAIN COMPARED.

That is, if the animal require thirty pounds of the best hay per day, to make an equivalent, furnishing all the elements of nutrition and growth, twenty pounds of hay and ten pounds of the meal of oats and corn ground together (equal parts) would be a feeding ration for perfect growth, and fifteen pounds of hay and fifteen pounds of the ground grains daily a good fattening mixture.

SECTION IV.—FORCING AND STIMULATION.

While it is of the first importance that strong and regular feeding be practiced in the improvement of breeding animals or in retaining the superior qualities already acquired, undue forcing, and especially the use of stimulating foods should be avoided. The man who resorts to condimental foods or artificial stimulation of any kind or too highly concentrated foods with breeding animals will surely find loss in the end.

It is usually resorted to in the male to impart supposed sexual vigor. The effect upon the fetus is the reverse of what is hoped. When used upon both sexes the result is seen in increased debility. In particular animals not breeders, to gain some special point in development, concentrated foods and condimental foods to spur the appetite may be admissible, but never in the line of practical profit. All condiments and special foods and stimulants of any kind are to be used only as we should give them in

disease, to tide over an emergency and for a special purpose. They should never be employed with breeding animals except in case of sickness, and then only under the advice of a professional veterinarian.

SECTION V.—NATURAL FOODS.

The natural food of farm animals are all the grasses, including all the cereal grains in their growing state, leguminous plants, including peas, beans, clover, alfalfa, either in the green or dry state, and their seeds. Four elements are chiefly concerned in the production of the food of animals; these are carbon, hydrogen, oxygen and nitrogen. Practically the first and the last are the important productions in food, since hydrogen and oxygen is a constituent in all foods.

Among vegetable substances gluten, including vegetable albumen, is the only one abounding in nitrogen—the most costly of agricultural productions. Gum, sugar, starch, are constituted of carbon, hydrogen and oxygen only. No animal can subsist for any length of time upon food destitute of nitrogen. This is one of two facts connected with the chemistry of food. The other is that a certain mixture of food is necessary.

WATER AND THE ANIMAL ECONOMY.

Water is simply a dilutant of food, enabling the soluble parts to be taken into the blood and thence distributed to the various parts of the body. Hence whatever the articles fed, there must be a proper proportion of carbon and nitrogen contained to supply daily waste and promote growth.

Grass is the natural summer food of breeding animals, the different forms of fodder being used in winter. But fodder alone will not keep the animal growing in winter, hence some grain must be used, and if straw is employed the grain must contain a larger proportion of nitrogen than with hay and well-cured fodder of other substances.

VALUABLE COMPOUNDS OF GRAINS.

Now, in 1,000 parts, wheat contains of gluten or albumen about 225 parts; barley, 66 parts; oats, 87 parts; rye, 109 parts; the grasses from two to four parts, and straw only a trace. It is also deficient in every other constituent of animal growth, except fiber, this being the only constituent held in excess. It is, therefore, certain that straw should only be used to distend the stomach where concentrated foods are given, as grain, meal, etc.

SECTION VI.—UPON FEEDING IN GENERAL.

Feeding must be practically carried on in accordance with the results sought. We have stated the necessities required in breeding animals. The same general rules will apply to breeding animals, that are appended in relation to growing and fattening animals.

There is a very great difference in the quantity of food which animals require, and in the time which they can pass without it. In general, those animals which are the most active require most, and those which are most indolent require least food. The cause of this is obvious; the bodies of animals do not remain stationary, they are constantly wasting, and the waste is proportioned to the activity of the animal; hence the body must receive, from time to time, new supplies in place of what has been carried off. Almost all the inferior animals have particular substances on which they feed exclusively. Some are herbivorous, some are granivorous, and others, again, are carnivorous.

From various experiments we have the following result:—

A horse will consume as much food, besides grain, as	8 sheep.
A cow will consume as much food, besides grain, as	12 "
A fattening ox will consume as much food, besides grain, as	10 "
A three-year-old heifer will consume as much food, besides grain, as	8 "
A two-year-old heifer will consume as much food, besides grain, as	6 "
A one-year-old heifer will consume as much food, besides grain, as	4 "
A calf will consume as much food, besides grain, as	2 "

RULES IN FEEDING.

There are some rules which may be advantageously adopted in feeding animals, which, however obvious they may be, are too often neglected. 1. Food should be so prepared that its nutritive properties may be all made available to the use of the animal; and not only so, but appropriated with the least possible expenditure of muscular energy. The ox that is obliged to wander over an acre to get the food he should find in two or three square rods—the horse that is two or three hours eating the coarse food he should swallow in fifteen minutes if the grain were ground or the hay cut as it should be—the sheep

that spends hours in making its way into a turnip, when, if it were sliced, it would eat it in as many minutes—the pig that eats raw potatoes or whole corn, when either cooked could be eaten in one quarter of the time, may indeed fatten, but much less rapidly than if their food were given them in a proper manner. All food should be given in such a state to fattening animals that as little time as possible, on the part of the animals, shall be required in eating.

2. From the time the fattening process commences until the animal is slaughtered, he should never be without food. Health and appetite are best promoted by change of diet rather than by limiting the quantity. The animal that is stuffed and starved by turns may have streaked meat, but it will be made too slowly for the pleasure or the profit of the good farmer, nevertheless no animal should have food constantly lying by him.

3. The food should be given regularly. This is one of the most essential points in feeding animals. If given irregularly the animal will consume his food, but he soon acquires a restless disposition, is disturbed at every appearance of his feeder, and is never in that quiet state so necessary to take on fat. It is surprising how readily any animal acquires habits of regularity in feeding, and how soon the influence of this is felt in the improvement of his condition. When at the regular hour the pig has had his mixture, or the sheep his rations, they compose themselves to rest, their digestion is not unseasonably disturbed, or their quiet broken by unwonted invitation to eat.

4. The animal should not be needlessly intruded upon during the hours of eating. All animals fatten much faster in the dark than in the light, a fact only to be accounted for by their greater quiet. Some of those creatures that are the most irritable and impatient of restraint while feeding, such as turkeys and geese, are found to take on fat rapidly when confined in dark rooms, and only fed at stated hours by hand. There is no surer proof that a pig is doing well than to see him eat his meal quickly and then retire to his bed till the hour of feeding returns. Animals, while fattening, should never be alarmed, never rapidly driven, never be fed at unseasonable hours, and, above all things, never be allowed to want for food.

CHAPTER IV.

HEREDITY IN BREEDING.

SECTION I.—HEREDITY OF DISEASE.

The heredity inclination to certain diseases in the progeny, to that of ancestor, requires no argument. It is an established fact. Among the most common are consumption, scrofula, bone-spavin and other diseases of the joints, blindness, grease, and in fact all so-called blood diseases. This hereditary predisposition to, or actual possession, may be derived from either parent, or from both. It may not be observed in individuals, or even a generation, but its recurrence in a succeeding one, shows that under certain conditions it may remain latent, from favorable sanitary conditions, and careful feeding or other causes. Hereditary disability may even lie latent for generations and then break out, and this even in collateral branches of a family. Liability to its recurrence is especially noticeable in animals strongly bred in and in, which intensifies any hereditary defect or peculiarity.

PREDISPOSITION TO DISABILITY.

There may be predisposition to disability from peculiarities of structure, that may be intensified by breeding successively to animals of like conformation. Immature and very young animals are quite apt to show constitutional deficiency in their young. They are delicate, liable to disease, and more subject to disability than those of fully mature animals.

In relation to predisposition to certain disabilities, Mr. Finlay Dun, an English veterinary authority, says:

Disproportion in the width and strength of the leg below the hock to the width and strength above the hock, predisposes to spavin; a straight hock and a short os calcis, inclining forward, gives a tendency to curbs; round legs and small knees, to which the tendons are tightly bound, are especially subject to strains; while a predisposition to navicular disease is found "in horses with narrow chests, upright pasterns, and out-turned toes."

Many farm-horses, as well as others without much breeding, are remarkable for consuming large quantities of food, for soft and flabby muscular systems, and for round limbs containing an unusual proportion of cellular tissue. These characters are notoriously hereditary, of which indubitable evidence is afforded by their existence in many different individuals of the same stock, and their long contin-

uance, even under the best management and most efficient systems of breeding. Such characters indicate proclivity to certain diseases, as swelled legs, weed, and grease.

SECTION II.—HEREDITY OF ABNORMAL CHARACTERISTICS.

The cases in which abnormal characteristics are perpetuated are too numerous, both in animals and man to require elaboration. It is especially seen in animals like the dog, that is brought in close social relation to man. Dogs of certain breeds carry instinct, or reasoning faculty in certain lines to an astonishing degree and transmit it to their progeny. The fear of man by wild animals, on the other hand, is fully as interesting as an abnormal heredity.

On certain islands, when first visited by man, the wild animals have no fear of him. In territories where they are hunted, the young at birth instinctively hide from him. In relation to the fifth toe in dogs and in fowls, they are abnormal, but by long breeding they are reproduced with only rare exceptions.

The tendency to lay on fat in particular parts, excessive muscular development, extraordinary secretion of milk by certain breeds, and also the quality of the milk in regard to butter or cheese-producing principles, are all abnormal, but by careful breeding rendered measurably constant. The lesson taught by all this is, how important that the breeder be carefully schooled in the physiology of animals, and in judging them by the touch and outward conformation.

SECTION III.—HEREDITY OF NORMAL ATTRIBUTES.

The heredity of normal attributes or characters, are the natural conformation, characteristics, color—in fact, the general likeness natural to the breed. Wild animals are so nearly alike that it takes a critical eye to distinguish between animals of the same sex and age; yet no two are precisely alike. Domestic animals of pure breeds have certain characteristics and peculiarities that are more or less constant, according to the length of time that has elapsed since the original formation of the breed. These normal conditions are not only those of the particular species, or the genus, but also peculiarities of color, shape, size, expression, bone and texture of hair always more or less perfectly defined. These, however, are so broken by interbreeding, feeding, selection, etc., that it is quite unsettled just where the normal and the abnormal begin.

SECTION IV.—HEREDITY OF FIXED CHARACTERS.

Fixed character may be said to exist where the abnormal, as contra-distinguished from the normal, become so fixed as to continue measurably permanent. They then may be considered normal, so far as that particular breed is concerned. Whenever an animal acquires form, color, substance or other peculiarity distinct from its parents, it is called abnormal. The continuation or cropping out of this from time to time, to a greater or lesser degree, still continues abnormal; but, the peculiarity being considered valuable, it is carefully bred to and animals are selected bearing the departure in the most marked degree. At length a peculiarity of form, disposition to lay on fat or secrete milk, fecundity, early maturity,—when either of these come fairly constant, it becomes then what may be termed fixed, and in time may be termed normal to the breed or sub family, although abnormal or monstrous, to the species or the genus.

SECTION V.—ATAVISM, OR BREEDING BACK.

Atavism, or breeding back, is the reproduction, in a descendant, of any peculiarity of ancestor, however remote. It is also called reversion, a really more intelligible word than breeding back. Atavism is generally met with in animals as the result of the crossing of two breeds. It would undoubtedly be more prominently shown as the result of hybridizing, were it not for the fact that hybrids are notoriously infertile. That this presumption is correct, is borne out by the impression left on female animals through the bearing of young by males of a different species as the ass, quagga, etc. It is more frequently noticed in animals bearing several young at a birth, as in swine and dogs, next in sheep, then in cattle, and less in horses than in any other animals. This is due, of course, to the more careful selection of breeding animals in the more superior races, but if the real facts were known it is due probably to the fact that it is more easily noticeable in the smaller animals from their prolificacy, and the less care bestowed in the selection of breeding animals. All this is only interesting to the breeding farmer, as suggestive of the value of a close examination of the animals selected in the course of breeding grades, that the more valuable traits may be perpetuated, and also in the breeding of pure animals, to know that family lines are clearly established and transmitted in the progeny.

CHAPTER V.

VARIATION AND CORRELATION.

SECTION I.—GENERAL CAUSES OF VARIATION.

The general cause of variations in animals is undoubtedly the changed or artificial conditions under which they are kept. The changed conditions of the animal in the process of domestication, induce the first tendency to variation; as domestication becomes more and more artificial the tendency to variation becomes intensified. Thus three centuries produced greater changes in the turkey, under modern artificial conditions, than would probably have occurred in thousands of years, man being in a barbarous state, and the conditions incident to food and breeding not unlike that of the wild animal. The manner in which all farm animals have been broken up into separate and distinct breeds within the last 150 years, shows that intelligent effort in this direction is the principal integer in variation to a fixed and desired end.

SECTION II.—SPECIAL CAUSES OF VARIATION.

The special causes of variation are those of climate, soil, and food; habit has been added, but this is simply an outgrowth of conditions of climate and food. As we go north we find all animals growing more and more dwarfed, the peculiarity becoming more marked in the larger herbivorous animals than among the smaller, and for the reason that in a climate where the horse and ox could hardly subsist, the sheep might find a fair subsistence. The animals not only become dwarfed, but altogether rougher in their general appearance. The hair becomes long, often furry, and sometimes animals acquire a taste for plants they would not eat in their original country, and for the reason that they are not found there. At first they will be refused in their new homes, but hunger causes them to be eaten at first and the taste at length becomes a fixed habit. In rocky and stony countries the form and consistence of the hoofs are changed. They become denser and more upright; while in some plains countries the hoofs become flatter and enormously spread upon the ground surface. From this it is easily seen that high feeding, precise care, good shelter, and careful selection may soon produce radical changes in an animal. The horns may be soon bred off. Fecundity, early maturity, propensity to fatten, and great secretion of milk, come first. Careful feeding and selection may carry these peculiarities

to such an abnormal degree as to make them appear as of another species to the superficial observer, yet the art of man has never carried the heredity of any characteristic outside the species, much less the genus, to which the animal belongs. Were it not for this fixed law of nature, the animal kingdom would have long ere this become inextricably mixed and confused.

SECTION III.—THE LAW OF CORRELATION.

Correlation is simply reciprocal relation. It must depend for existence upon something else. Darkness and light are correlatives. The son is correlative to the father. The law of correlation really as recognized by naturalists, is an arrangement of dominant characters in an organization, by which a principle of development and suppression appear. It is, in fact, a law of reciprocity, mutual action and reaction. Hence in animals a development of one organ or set of organs should be accompanied by a corresponding modification or suppression of some other organ or organs of the system. Hence the naturalist can determine from a portion, or in fact from a single bone, the class and order to which an animal belongs, its habits and mode of living, and its food. Hence the axiom that one particular part of the body acquiring a high degree of development, some other parts stop short. As a striking instance: The elements constituting the human brain are wonderfully developed, while the elements constituting the face are in a corresponding degree deficient. The cases that might be cited as bearing distinctly on the subject, are innumerable. Animals showing great beef-making powers are correspondingly deficient in milking qualities, and *vice versa*. This may serve for an elucidation of the subject so far as live stock is concerned, for while occasionally an animal is found combining milking and fattening qualities in an eminent degree, it is rare, and it is not possible to find a breed combining milking and beef-making qualities in the highest degree. But there are breeds, as the Ayrshire, that combine good milking, beef-making and early maturing qualities. That they are not profitable in the west in this day of special breeding, is proved from the fact that although they have been known as long as the other improved milking breeds, others have superseded them. The same is the case with Devons. They combine, measurably, qualities of labor, beef and milk. They have never held their own in the west, and neither

the Devon or Ayrshire will become popular in any district devoted exclusively to beef or milk.

SECTION IV.—CORRELATED STRUCTURE.

In animals, the structure must be in accordance with the service required. For speed there will be an absence of fatty tissue and an abundance of nervous energy in combination with muscular development. In the draft horse, a more phlegmatic disposition, combined with ability to carry flesh, less flexibility of the limbs, but with larger and less dense bone. In cattle the beef animal will be developed into a square-rounded form, while milking qualities will be indicated by a more angular organization. In sheep the form will be modified by the ability to produce mutton especially or wool especially. In the Merino the ability to produce heavy fleeces of very fine wool is notably at the expense of the best mutton form, while in swine bred for many generations solely for flesh and fat, the departure from the original form is probably more marked in a single direction than in any other animal. That is, excessive accumulation of fat, incompatible with continued life in any wild species.

SECTION V.—CORRELATION BY CHANGED CONDITIONS.

Changed conditions, as through climate, care, feeding, and the outline of a country, have already been touched upon. Animals adapted to a hill country become essentially different from those of a plains country. The Devon, for instance, among highly-bred animals, and the Texan cattle among half wild ones, are notable examples. Natural selection, that is, the survival of the fittest, have produced wonderful adaptation of means to an end in wild animals, in various peculiarities of the same genus. Man, taking advantage of this by artificial selection and special care and feeding, has broken up our domestic animals into sub-families, that unite in themselves the special characteristics that go to make up what we call breeds. They are not only adapted to special localities, but also to special wants. It is not unlikely that we are more than on the threshold of scientific breeding, that shall in the near future give results nearly exact in the progeny, as found in the line of ancestors. This is, in fact, sure to follow. We do not yet understand that nicety of breeding by which the correlation of parts shall be so nicely balanced, as to give the greatest perfection of digestion, assimilation, circulation, and such balance of other viscera as to give

a perfect correlation of one part to the others for the purposes wanted. It has, however, been measurably reached in the Shorthorn, Hereford and Polled Angus for beef, and in the Jersey and Holstein as milkers. The development of milking powers in beef-making animals, or of aptitude to take on fat among milking breeds, will surely result in deterioration, in essential change in the really valuable direction in which the animal has previously been bred.

CHAPTER VI.

FECUNDITY AND EARLY DEVELOPMENT.

SECTION I.—CAUSES OF FECUNDITY.

The power of reproduction in animals is only shown in the highest degree under natural conditions. That is, give an abundance of food, free exercise, the absence of exhaustive exertion from fright, excessive labor, and exemption from debility through excessive cold, will produce the greatest number of living, healthy young. Wild animals in a state of confinement rarely breed. Among domesticated animals, it is most noticeable among fowls, and for the reason that the natural propensity of all birds is that of activity. Mr. Darwin found that an animal generally sterile under confinement when it happens to breed, the young apparently do not inherit this power. For, he says, had this been the case, various quadrupeds and birds which are valuable for exhibition would have become more common. My observation leads me to think that the reason why, of late years, births have been more common among wild animals in captivity than formerly, is that they are now more freely exposed to the air and receive more exercise, especially so with our traveling shows. The lesson here to the breeder is the necessity that to induce the greatest fecundity, as well as to give constitutional vigor to the young, is to be found only in allowing breeding animals as much liberty as possible in connection with varied and wholesome food.

SECTION II.—CAUSES OF EARLY DEVELOPMENTS.

The early development of animals is entirely due primarily to artificial care—shelter, and regular, nutritious and varied foods. The power of heredity soon follows. The animal becomes constitutionally changed in the course of generations, and the transmission of qualities leading to early development become more or less fixed and capable of sure trans-

mission. But if the care and feeding necessary to produce this early development be intermitted, it takes far less time to cause the animal to degenerate and go back to the original condition than it did to bring it up to the acquired condition. A study of the laws of correlation will easily show this. Hence it is not necessary to cite instances. The general law will suffice, as previously stated. In all this the breeder will see the necessity of careful feeding and special care in all superior bred animals. Without this the investment is a failure. It pays to give common stock good care. With superior stock and superior care success is assured. By care we do not mean pampering. Good care means exercise sufficient to keep the appetite good, and the breeding qualities of the animal perfect, with such variety of proper food as will most naturally and quickly develop the essentials required.

CHAPTER VII.

OUT-BREEDING AND IN-BREEDING.

SECTION I.—CLOSE BREEDING VS. CROSSING.

Close breeding does not necessarily imply incestuous breeding; that is, the breeding of a sire to the progeny of a dam served by him; the breeding of a male to his mother, or the breeding together of male and female, the produce of one sire and dam. This is, indeed, close breeding. But the breeding together, what we understand by close breeding in the general acceptance of the term, is the breeding together of animals so closely related, as what in the human family would be of uncle, aunt, first or second consins. The closer breeding may be more properly termed in-and-in breeding.

CROSS BREEDING.

Cross breeding, in its fundamental sense, is the mixing of the blood of two distinct breeds, but of the same species. That is, the pairing together of animals having no blood lines in the pedigree in common, except that extending beyond the time when the breed was originally formed. Thus the breeding together of any two animals as Devon with Short-horn, Hereford, Angus, or any combination of these would be cross breeding. The use of a sire of any of the improved breeds of a country on the common stock of a country is cross breeding. All these, from a standpoint of a breeder of thoroughbreds would be considered as violent crosses, and properly as damaging to his particular breed. Yet all exist-

ing breeds have originally been formed by crossing two animals of distinctive characters, improvement by selection being the first step in the improvement of animals from the wild state.

SECTION II.—IN-AND-IN-BREEDING.

In-and-in-breeding is the breeding together of animals of very close relationship, as parent to its young or vice versa, brother to sister, or in fact any relationship as close or closer than first cousins. Youatt defines it as, "the breeding from close affinities;" Johnson, "the breeding from close relations;" Randall, "breeding between relatives without reference to the degree of consanguinity;" Bowley, "it should only be applied to animals of precisely the same blood, as own brother and sister;" Sinclair, "breeding from the same family, or putting animals of the same relationship together;" Stonehenge, "the pairing of relations within the degree of second consins, twice or more in succession." Hence it will be seen that the most eminent men who have written within the present century differ widely. The very closest in-and-in breeding is the pairing of brother and sister; the pairing of a sire to his female progeny is only half as close as this. That is to say, brother and sister would represent 100; sire to progeny, 50, or 50-A, 50-B; the pairing of consins would represent 25-A, 50-B, 25-C. That is, one-fourth of the blood of A, one-half of the blood of B—because it would follow in two lines—and one-fourth of the blood of C. Hence this would also represent 50 on the scale, but not so potent, since it was bred partly through the channel C. To show this carried out it would be as follows: The sire A, gets progeny from dam B, which contains one-half blood of A and one-half blood of B. Suppose there are two females as progeny. From another line not consanguinous, there are two males. These are coupled with the female progeny of A and B, and are therefore first cousins, containing one-fourth of the blood of A and $\frac{1}{2} + \frac{1}{2} B = \frac{1}{2} B$, and also $\frac{1}{4}$ of the blood of C = 100. That is, 50 of the blood of B, but broken, or scattered, by the blood lines of C and D. Now, if these two consins are bred together the blood lines of the progeny would be precisely the same as that of their parents. The breeding of the progeny of these two, if continued in, would be as fatal in the end as the breeding of the progeny of brother and sister, but would take longer to produce the intense effect as it would in the breeding of the produce of

the sire to dam, or the breeding together of brother and sister. The effect is to give delicacy to the constitution, to intensify the milk, beef, labor or other qualities as the case may be. At the same time the animals are more liable to disease and not so well calculated to stand climatic and other changes. Hence persistent breeding in-and-in, except to fix certain valuable qualities of two breeds, is not desirable and should not be undertaken unless the breeder have nice discrimination and the ability to judge when this breeding is likely to be carried too far.

SECTION III.—LINE BREEDING.

Line breeding is defined by some as breeding one sub-family up on itself; as, for instance, in Short-horns, breeding Duchess on Duchess or Princess upon Princess. By others, the union of sub-families, or "sorts," having a common foundation without violent out-cross. Breeding-in-line, as popularly understood, is when the selection of males is limited to a particular sub-family of a breed but without special reference to quality or uniformity of the sires. If there is anything in the term breeding-in-line, it should mean the selection of animals of a common type belonging to the same sub-family, and having the characteristics of the sub-family in an eminent degree. This would not necessarily imply incestuous breeding. To fix any quality, distinctive in the sub-family, and which appeared to be lessening or wandering, close breeding, even the incestuous breeding, of animals having this markedly, would certainly be allowable.

SECTION IV.—CROSS-BREEDING.

Strictly speaking, cross-breeding is the coupling of animals of two distinct breeds, and is the direct opposite of in-and-in-breeding. Instead of intensifying the blood lines of two animals it mixes the blood of two distinct animals, and to produce homogeneity thereafter, the most scrupulous care must be taken to breed together such animals of the descendants as most closely resemble the type you have selected.

In a more general way, the term crossing, cross-breeding, making a cross or out-crossing is used in contradistinction to the term in-and-in breeding and line breeding, as indicating such breeding as would produce a mixture of the blood of two sub-families, or varieties, of the same breed, but whose origin runs together quite remotely. In the breeding of animals when the purity of certain family blood lines are not essential, as in animals intended for general uses, there is no objection to its use, if the particular breed

is not departed from. It is also necessary when the constitution is impaired from too close in-breeding, or from breeding closely in line. In the establishment of new breeds, cross-breeding is most valuable, especially in remedying some defect in the course of breeding up subsequent to the first cross in the foundation stock of a breed. The most notable success in cross-breeding is in some of the English breeds of sheep, and also in swine, and for the reason that, from their prolificacy, starting back to the original line is comparatively easy. It must, however, be remembered that no good can accrue in the crossing of two distinct breeds, except it is by the deliberate judgment of one well versed in the physiology of animals.

SECTION V.—BREEDING OF GRADES.

A grade, strictly speaking, is the produce of a cross between any pure bred animal and the common cattle of mixed blood of a region. Generally, however, a grade is understood to be the progeny of any two animals, one of whom is of improved blood, or of two animals of mixed blood, but each containing on one side blood of pure lineage, and of the same breed. Accepting the term grade in its true sense as the progeny of an animal—male—of pure blood bred to a female of common or cold blood, the term low grade would be used to designate an animal of less than one-half blood, and a high grade an animal containing more than one-half of pure blood. For further information the reader is referred to Chapter II.

CHAPTER VIII.

GESTATION OF ANIMALS.

SECTION I.—VARIATION IN GESTATION.

While the average gestation of animals is constant the variation from various causes is quite considerable. The average period of gestation in mares is eleven months. It may be diminished, according to Youatt, five weeks or extended six weeks. In cows, according to the tables of Earl Spencer, the average period in 740 cows observed was 285 days; the least period 220 days; and the greatest period 318 days. In sheep, according to M. Tessier, a French observer, 676 ewes, out of 912 observed, lambed to average 152 days in gestation. The shortest average and longest period of the whole number was as follows: Shortest period, 150 days; longest period, 155 days; average time of gestation, 152½ days.

This would give the average period as twenty-one weeks and six days. In sheep, careful observations show that breeds differ in their period of gestation. Darwin, on the authority of Nathusius, states that the average period of gestation for Merinos is 150.3 days; Southdowns, 144.2 days; Merino and Southdown cross, 146.3 days; three-quarter grade Southdown and Merino, 145.5 days; seven-eighths bred Southdown and Merino, 144.2 days. We give the decimals to show the exact computation.

In swine, the observations are less full. Darwin records the observations of M. Tessier, as varying from 109 to 123 days, average, 116 days. Youatt states the variation in well bred pigs observed as ranging from 101 to 116 days, average, 108½ days.

In conclusion we may state that the probability is that highly bred animals, and especially early maturing ones, have a shorter period than those of robust constitutions, and especially animals that mature late, and also that small breeds of a species gestate for a shorter period than larger breeds. The table in the appendix will show the periods of all domestic animals.

SECTION II.—INFLUENCES REGULATING GESTATION OBSCURE.

The influences operating on gestation are not well known, in fact, of the law that governs gestation nothing is known at all. An animal, as a rule, carrying male young will cover a longer period of gestation than if the young is a female. But of the cause why the young is male or female nothing is known. Season, that is, particular years, would seem to have an effect, and it seems to have an influence, not only in determining sex, but the period of gestation. Heredity, that is, peculiarities incident to families, also appear to influence not only the period of gestation but also the sex of the animal. An animal not well fed in winter will probably have a prolonged gestation; and animals irregularly fed, irregular gestation. Digestion, assimilation, the general health of the animal, exposure to cold, will all operate toward prolonged gestation without doubt, since all these tend toward slow and abnormal nutrition. A decision, approximately, can only be arrived at through an extended course of careful experiment, when the conditions as to food, general health, vigor of the animal, etc., are carefully noted.

CHAPTER IX.

PHYSIOLOGY AND FACTS IN BREEDING.

SECTION I.—PRINCIPLES OF BREEDING.

As embodying many facts collated from various sources, I find in an address before the Massachusetts Board of Agriculture, much valuable matter, embodied by Dr. James Law, professor of veterinary science, of Cornell University, New York. Those of especial interest I have taken the liberty of presenting, and especially because of their physiology, and preferably give the facts in Dr. Law's own words:

At the foundation of all excellence in stock lie the principles of breeding. Error here, however venerable or deeply rooted, is especially to be regretted, as, like the spores of the cryptogam in the planted seed, it will fructify in the growing product and blast the harvest, in spite of the most careful tending and culture. He who avails of the rich experience of the past hundred years, reaps his substantial reward in the yearly increasing value of his stock, while the man who ignores or despises it soon realizes in his barren fields and stunted, unproductive herds, that what is not well done is not worth doing at all.

SECTION II.—PRINCIPLES OF LIFE.

The better to illustrate the known facts and principles which enable us to control the breeding of animals, let us glance shortly at the organisms through which reproduction takes place. In all the higher animals this is by the union of the products of the two sexes, the ovum or egg of the female and the spermatozoon or vitalizing element of the male. In the female the two ovaries produce vesicles from birth, like those in which the ova afterward grow, but until they reach the bearing age these do not mature, nor are true ova produced. When the system has sufficiently matured to afford a surplus nutrition for the reproduction of its kind, an increased supply of blood and nervous energy to the ovary hastens the maturity of one or more of these vesicles; they burst as a ripened fruit must fall, and the liberated ovum, descending the fallopian tubes to the womb, finds that the new-born activities of that organ have elaborately prepared and fitted it as a home for its development in the immediate future.

In healthy females, from the approach of maturity to the decline of life, when many other functions as well as the reproductive ones are lost, this development and discharge of ova persists, and with it the

power of generation. Heat or rut is the commitment of such rupture and escape.

But without the addition of the male or fertilizing element to the ovum, its escape is but the prelude to its destruction, as it no longer retains in itself the power of assimilation and increase, but is thrown off, together with the exudation in the womb, as a waste and useless thing. The male semen is an albuminous fluid secreted by the two testicles, and in health discharged only during strong sexual excitement. It contains myriads of minute organisms (spermatozoa), bearing a strong resemblance in most animals when magnified, to tadpoles, and having a similar but much more active power of motion. These last elements appear to be the true fertilizing agents, as Spallanzani found that the fluid obtained by filtering the liquid had no power to fecundate the ovum, whereas the material left on the filter proved successful. Moreover, these are the only elements in the male seminal fluid having the innate power of motion, and since in animals killed a day or two after coition the ovum is found in the fallopian tube, undergoing that segmentation and division of its yolk which results from impregnation, and is besides surrounded by spermatozoa, there can be no reasonable doubt that they alone are the fertilizing constituents. Further, the spermatozoa are found in the testicles, the removal of which destroys the power of procreation, and have not been found in the semen of mules and other barren males.

SECTION III.—FORM OF THE OVUM AND ITS DEVELOPMENTAL CHANGES.

As discharged from its ovarian (Graafian) vesicle, the unimpregnated ovum is a globular mass, with an external granular layer of club-shaped bodies (granular layer); within this a layer of transparent albuminous matter (zona pellucida); still more internally the spherical yolk granules, among which lie the germinal vesicle with its germinal spot.

Until fertilized it is incapable of change. The first indications of development are shown in the segmentation of the yolk into two equal masses, of these into four, of those into eight, and so on, the numbers doubling each time from the binary segmentation of each cell until the yolk is largely increased in bulk, and presents a uniform mass of uniform granules, and a smooth investing membrane. At the commencement of this segmentation of the yolk, the germinal vesicle and spot disappear,

and in the mammalian ova has hitherto eluded all attempts to trace it, though it has been pointed to as the center of this work of segmentation and increase in the yolk. At the same time the spermatozoa can be seen in the membranes surrounding the yolk, and even in the yolk itself, as may readily be seen in the rabbit's ovum, taken sixty hours after connection with the buck (male).

When the segmentation of the yolk is completed, there appear new developmental changes at one point of its surface, and in the membrane (germinal membrane) investing it. This consists in a thickening of the membrane in the form of an ovoid, in the center of which the rudimentary elements of the young animal soon become apparent.

We have thus glanced at the main points of the phenomenon of impregnation. We have traced the steps resulting in the union of two living elements, derived from different animals, incapable of separate existence, but potent when combined not only to lay the foundation of a living being, but to insure that this being shall develop the qualities of the male and female from which it sprung, alike in form, size, color, vigor and power of enduring hardships, constitution, mental powers, and even proclivity to disease. This point must never be forgotten in connection with subsequent developments, that here, in the initial stage of the individual existence, all the characters of the future animal are determined by the unseen but not the less real properties of those two simple germinal structures—the ovum and spermatozoon. These have no less individuality and character than the animals from which they sprung, and as the ovum and spermatozoon of the rabbit and horse do not appear to differ materially from each other, we are here brought face to face with one of the mysteries of creation, a mystery which we can no more explain than we can explain why in the adult being one cell or particle of living matter should always abstract from the blood and elaborate into tissue the materials of bone, another those of muscle, and another of nervous tissue.

SECTION IV.—MEMBRANES AND NUTRITION OF THE FETUS.

Our present purpose does not demand that we should trace the development of the ovum in all its stages into the fetus. But it is important to note the connection of the fetus with the mother, and how it is nourished in the latter period of gestation.

The fetus floats in one water bag (Amnion) en-

closed in another (the allantois), which among other functions fulfill that of protecting the young animal from being injured by the movements of the abdominal organs, or by external objects coming in contact with the abdomen, and that of steadily dilating the external generative passages by a soft, equable and yielding pressure, preparatory to the expulsion of the fetus. The amnion likewise receives any dejections in case the bowels act before birth, while the Allantois is the receptacle for the urine which is conveyed from the anterior extremity of the bladder through a special channel (urachus) in the navel string. Outside the allantois and lining the womb is the vascular coat (the chorion), whose functions are the most pertinent to our present purpose. The blood of the fetus is conveyed to this membrane by the two umbilical arteries, branches of the internal iliacs, and after breaking up into capillaries in its substance is returned by the umbilical vein. Branches are given off from these vessels for the nourishment of the three membranes, but the blood is mainly distributed on the villous process of the chorion to absorb the nutriment matters from the blood of the mother.

NUTRITION OF THE FETUS.

The inner surface of the mucous membrane of the womb, even in the unimpregnated state, is perforated by numerous orifices leading into two kinds of uterine follicles, one consisting in simple depressions terminating in blind ends, the other consisting of elongated tubes, usually spiral, and smaller tubes branching off from their sides like the ducts of a compound secreting gland. These uterine glands are abundantly supplied with blood by a rich network of capillaries in thin walls, but are functionally inactive until conception has taken place. Then they undergo a great increase in size, become increasingly vascular, and secrete the nutrient matter for the support of the fetus. The outer fetal membrane, the chorion, develops villous processes, on which the blood-vessels especially ramify, and which fit accurately into the uterine follicles. These villi may be seen in the afterbirth of the cow to have numerous small secondary villi branching off from their sides, and corresponding to lesser tubes of the uterine follicles.

In ruminants, the uterine glands are not scattered over the entire surface of the womb, but accumulated at about fifty points on little rounded elevations,

connected with the wall of the uterus by a narrow neck, and known as cotyledons. These cotyledons increase to a diameter of one or two inches after conception, and the villi of the chorion are aggregated into an equal number of cotyledons, which thus fit into the uterine ones.

We have thus brought into the most intimate relations, and over the most extended surface, the rich network of capillary blood-vessels in the uterine walls, and the equally rich network on the outer membrane of the fetus. The maternal and fetal vessels are only separated by a delicate membrane and a single layer of cells.

SECTION V.—CAUSES OF STERILITY.

One of the troubles of breeding is an occasional failure to procreate on the part of the male or female, and this section would be incomplete without a reference to such an unfortunate occurrence and its more common causes.

In the male sterility sometimes follows a too early and excessive use. The calamitous abortions in the dairy parts of New York have been shown to be slightly more abundant where male and female alike have been bred for generations at too early an age. Confining our attention to the male, we see that the spermatozoa are developed in the secreting cells of the testicle, that they require a certain time for development, and that if sexual connection is too often repeated, these are no longer discharged, or are emitted in an immature condition, the fluid being mainly or entirely composed of the secretion of the seminal vesicles and other glands situated along the course of the urethra. This condition is likely sooner to occur in young, partially developed animals, in the very old, and in those in low condition and weak constitutionally, or as a result of overwork, starvation or other debilitating influence. Such weakness is indeed oftentimes associated with an absence of spermatozoa in the semen.

The case is the same if the testicles are but partially developed, and in all cases in man or animals in which the testicles are retained in the abdomen or the inguinal ring, in place of descending into the scrotum, microscopic examination has failed to show the presence of spermatozoa. (Curling, Goubaux.) Disease of the testicle or of its excretory duct, whether inflammation which permanently impairs the structure and functions of the secreting organ, or fatty change in pampered animals, which unfits it

for secretion or emission, is an insurmountable barrier to procreation. Fatty degeneration may sometimes be overcome in its earlier stages by increased exercise and spare diet. But starvation is not to be advocated in ordinary cases. The animal, whether male or female, that shows the most vigorous health, being neither too obese and plethoric nor too thin and weak, is likely to be the best stock-getter. I have seen two flocks of sheep put to the same ram, kept in the same field, and on the same diet, yet the flock which was in the best condition from previous good feeding produced twins in almost every instance, and several triplets, whereas the poorer, but by no means low-conditioned flock barely reached the average of one lamb and a half to each ewe. The male, subjected to a severe drain by frequently repeated connections, demands a rich, nourishing diet, as well as a moderate amount of exercise to maintain his vigor, stamina and generative power.

Local troubles sometimes lead to temporary impotence in the male. Excessive and painful erection from a too frequent use or some other cause of irritation, such as catarrh or ulceration of the sheath of the penis or of the urethra, usually contracted from the diseased female, or from one served too soon after parturition, and while the consequent discharges from the womb or passages continue; paralysis of the penis from blows or otherwise; sprained loins, spavins, or other malady of the hind parts which torture the animal when he mounts.

The female often conceives with difficulty, if she has not been used for breeding in early life, and hence many follow the rather questionable policy of putting her to the male at as early an age as she comes in heat, no matter how young. The New York abortion reports show the danger of this, in weakening the constitution, and above all the generative organs, when persisted in for a succession of generations, and when the young animal is milked after the first calf. A celebrated Scotch breeder of Shorthorns, however, Mr. Douglass, of Athelstaneford, asserts that neither constitution nor stamina suffer from breeding at a year old, provided the heifer is abundantly nourished during pregnancy, and is not milked during the succeeding year.

A second cause of failure is serving too soon after parturition—in the mare, for instance, two or three days after foaling. The womb has oftentimes not fully contracted at this date, a condition not con-

ducive to conception; and it too commonly still discharges a muco-purulent matter. Now the presence of pus in the womb or passages is found to be fatal to vitality and movement of the spermatozoa; so that until this has ceased it is folly to put to the male. Connection in these circumstances has the additional disadvantage, as we have already seen, of frequently inducing disease in the male.

Over excitement of the generative organs, whether from excess of highly stimulating food, plethora, or disease of the organs, may stand in the way of conception. Hence it is found that bleeding before putting to the male often calms such irritation and secures a successful result. Low feeding before and during rut in animals showing this tendency will sometimes succeed, and waiting until heat is passing off will equally favor conception. A system practiced in Arabia of sweating a mare before presenting to the horse may have been partly suggested by its influence in distracting attention and thus quieting sexual excitement, though it may on the other hand have been resorted to with the view of calling out the full vigor of the dam at the time of conception in order to perpetuate it.

Obesity in the female, as in the male, is a cause of sterility. Fatty transformation of the ovaries prevents the evolution of the ova, and fatty deposit in the Fallopian tubes opposes the descent to the womb of such as may be formed. This is above all noticeable among our Shorthorn cattle, and may be prevented or even cured in recent cases by changing the diet and regimen. Captain Davy succeeded in getting such heifers to breed, by turning them out on a bare common with a young bull, or by using them in the plough, and Mr. Webb was equally fortunate with two valuable barren cows, after walking them over one hundred miles to his farm at Babraham. In animals disposed to the production of fat, any excess of hydrocarbonaceous food (oil, starch, sugar,) will endanger the breeding powers, but curiously enough sugar in man and animals alike has been found to be specially productive of sterility.

Other diseases of the ovaries or womb besides fatty degeneration will destroy fertility. Thus cows with tuberculous deposit in the ovaries, though in continual sexual excitement, and ever ready to receive the male, are incapable of procreation.

The tendency to barrenness is increased by too close breeding, but this cause will be noticed later on.

A female is often sterile because of a rigid closure of the neck of the womb, the result of spasmodic contraction or of disease. Mares previously barren have been rendered fruitful by dilating the neck of the womb by the fingers and thumb drawn into the form of a cone, and passed through the opening just before putting to the horse. If too rigid to be opened in this way it must be incised with a knife fitted into a grooved handle (a bistoury), and the opening maintained pervious by a sponge tent until healing has been completed. In cases of this kind I have experienced the advantage of using the largest female speculum prolonged by a tube of sheet tin.

It is sometimes advised to allow repeated connection in order to secure conception, and doubtless in the natural state coition is usually repeated a number of times. But as we keep animals in an unnatural state, and have changed their forms and functions to serve our own ends, this is no reason why we should not conserve the powers of a valuable male, that we may multiply his value in a more numerous progeny, if one service is found to be sufficient, rather than that we should be wasteful of his powers by squandering them unduly on a limited number of females. The myriads of spermatozoa discharged in a single act, amply suffice to render the ovum or ova prolific, provided there is no obstruction to the entering the womb and being there retained. At the same time, during great sexual excitement, such obstruction is at times met, or the semen is discharged after having entered the womb, and a second connection when the excitement is less intense will prove more successful. But as some females will take the male after impregnation, and as connection in these circumstances often causes abortion, the female should not as a rule be presented to the male more than twenty-four hours after having been first served.

Ergot, smut, weakened constitution, digestive and urinary disorders, resulting from improper feeding of breeding animals, fright, mechanical injury and other causes of abortion, need only be mentioned here as additional causes of sterility.

SECTION VI.—HEREDITARY TRANSMISSION.

To turn from the consideration of the mere production of valuable breeds, we find that the foundation of all success lies in the common aphorism, "Like produces like." As the acorn develops into the oak, and the wheat into the wheat plant; as the horse, ox, sheep and pig reproduce their respective kinds, so

are the corporeal, constitutional and mental qualities of particular animals reproduced in their progeny. The rule holds alike as regards good qualities and defects—the bone and sinew, the fire and vigor of the race horse; the muscular development and energy of the trotter; the weight, strength and activity of the Clydesdale; the placid eye, loose-build, heavy hind parts and large vascular system of the Ayrshire; the rounded form, early maturity and fattening quality of the Shorthorn; the sweet, juicy mutton of the Highland breeds of sheep; the fine wool of the Southdown, or Merino, or the early maturity and fattening qualities of the Leicester.

Perhaps no better example of the hereditary transmission of valuable qualities can be found than in the English thoroughbred race-horse and Shorthorn. The Duke of Newcastle and Mr. Fenwick are reported to have said in Cromwell's time that "the meanest hack from Tangiers would produce a finer progeny than could be expected from the best sire of the native breeds." And since then the world-renowned English racer has been produced mainly by crosses from the best types of Arabs and Barbs. From the Byerly Turk descended King Herod, which got four hundred and ninety-seven winners at the various race-courses, computed to have gained to their owners £201,505. Eclipse, from the Darley Arabian, got three hundred and thirty-four winners, which brought their owners £160,000. The basis of excellence was laid by infusing the blood of the Turk, Barb and Arab, yet by a careful selection of animals showing superior qualities, the progeny has so far improved that the native Arab is now considered no match for the English racer, but is allowed a discount of thirty-six pounds when contending with the latter in the Goodwood races. As showing a similar improvement over native breeds, it may be mentioned that no "cocktail" (seven-eighths or fifteen-sixteenths racing blood) has been known to win a race of 2½ miles in competition on equal terms with the thoroughbred.

The Shorthorns equally date their origin from the bull Hubback, purchased by Colling from a poor neighbor. And so well have the qualities of early maturity and power of accumulating fat been perpetuated and improved, that no grade Durham, however excellent his personal points, is of the same value for beggitting the same quality in his progeny. And yet this excellence has been obtained in the

case of the racer in about two hundred years, and in that of the Durham in one hundred.

But the fundamental principle that like produces like is not an inviolable rule; were it so every breed would retain the same qualities throughout all time and no improvement could be effected. Variations always take place, sometimes from unknown causes, sometimes from causes under our control; and in our ability to solicit, to foster and to perpetuate such variations, lie all our powers of improving a breed. As these variations may be the cause of deterioration as well as of improvement in breeds, an intimate acquaintance with them and their results is absolutely essential, not only to beget new excellence, but to maintain and perpetuate the old. I will recount a few of the known causes of variations.

SECTION VII.—CAUSES OF VARIATION.

Under a more abundant diet the intestinal canal of the domesticated cat and swine becomes more lengthy and capacious than those of their wild progenitors. Hogs allowed to run wild on the bleak Falkland Islands have reverted in form and other characters to the type of the wild boar; not so with those turned adrift on the rich soil of La Plata or Louisiana. A similar result took place in a pig of Nathusius, seized at two months old with a disease of the digestive organs, which permanently interfered with digestion and nutrition. Though a highly bred Berkshire it assumed the long snout, the coarse bristles, ridged back, flat sides and long legs of the wild boar or unimproved breeds.

So with the native cattle and sheep of the bleak mountains of Scotland and Wales, of Kerry and Brittany, which have degenerated to the smallest types of their kinds. The fat-tailed sheep of Kurdistan is said to lose its fatty rump when removed to Russian pastures. The ponies of Norway and Sweden, of Iceland, Shetland, Wales, Devon, Brittany, Corsica and Sardinia illustrate the same point. The horses running wild on the Falkland Islands have degenerated to ponies within a comparatively recent period.

Conversely, a richer food increases bulk. Ayrshire cows removed at four or five years old to the richer land of the Lothians increase marvelously on the better keeping. The wonderful excellence of the Durham cattle was no doubt rendered possible by the rich pastures of the Ouse and Tees, and is now maintained by the artificial and forcing system of

feeding so common in such herds. So with the English racer; he is grained from the very earliest age, and to an extent which would fail to be remunerative in ordinary priced horses. At a month old he gets a quarter of a peck daily, and the amount is steadily increased with his growth.

When we want to develop bone, muscle and vigor, this rich and dry feeding is demanded, but where rapid growth and early fattening only are desired, as in animals for the butcher, then a softer and more aqueous but equally nutritive diet is essential.

CLIMATE AND VARIATION.

Climate is not without its influence on variation. Certain races do not survive in particular climates; they must change their characters or die out. The Newfoundland dog has lost most of his distinctive characteristics in England. He has not hitherto been able to survive in India, nor at the Cape of Good Hope. Greyhounds, pointers and bull-dogs rapidly lose their distinctive forms and mental qualities in India. The third generation of the bull-dog has acquired a sharp nose, thin body and hanging ears, and his native pluck is equally gone. The Thibet mastiff, taken from his native mountains to the humid plains of India, speedily dies out.

Horses, as we have seen, fall off in size in bleak islands. The same appears to hold concerning very humid countries, as in the Falkland Islands, and to the east of the Bay of Bengal, in Pegu, Ava, Malabar, Siam, the eastern archipelago and most of China. They, on the other hand, attain their greatest native excellence in a clear, dry climate, like that of northern Africa.

Shorthorns removed from England to Ireland are found to become more hairy and coarse in their coats. A once celebrated breeder of Shorthorns on this side the Atlantic, when remonstrated with for keeping his cow-houses so warm, tersely remarked that he "could better afford to lose one of his herd at intervals than to render them hardier at the expense of some of the excellences due to the forcing system."

It was attempted to breed high class Leicester sheep on the bleak Lammernair Hills, in Scotland, but they deteriorated so rapidly that the attempt had to be abandoned. At Angora not only goats, but shepherd's dogs and cats have fine fleecy hair (Ainsworth). The sheep of Korakool lose their black curled fleeces when removed to any other coun-

try (Burnes). The European sheep loses all its wool except on the loins, after the third generation, in Antigua and the west of Africa, appearing like a goat with a dirty door-mat on its back (Nicholson). In the lower heated valleys of the Cordilleras the wool of the sheep becomes thin and hairy, unless frequently shorn. Changes of a lesser degree take place in the wool of sheep kept in different localities in England, as well as of those taken to Australia.

These rapid changes are but indices of the more extensive ones to which climate has largely conduced in producing the many widely distinguished varieties of animals native to different localities.

INFLUENCE OF SOIL.

The influences of feeding and climate are closely allied to those of soil. A rich soil abounding in limestone appears essential to the full development of the larger and more improved breeds of animals. Mr. Thorn, Dutchess county, N. Y., gave up breeding Shorthorns because of the deficiency of lime in the soil. The same breed has been found to degenerate on the poorer sandy soils of Massachusetts unless allowed a liberal artificial diet. The good effects, however, of soil, climate and diet may be to a large extent obtained by careful housing, local drainage, a warm southern exposure of buildings and parks, and a liberal system of artificial feeding.

EXCESSIVE USE OF PARTS.

This, if it does not unduly exhaust the vitality of the part and its power of nutrition, will certainly determine an increased development. This is indeed a wise provision in the animal economy, to strengthen an organ to perform the work demanded of it. We have a familiar instance of its effects in the blacksmith's arm, or in the professional dancer's leg. The extraordinary development of one kidney when the other has been destroyed is equally characteristic. A patch of inflamed skin (*i. e.*, a pimple on the face) afterward grows long hair; a cock's spur transplanted to his comb grows to four or five inches long (Hunter). Hard work increases the thickness of the scarf-skin on the hands; pads form on the knees of the Ceylon sheep, which kneel to browse the short herbage, and a new growth of bony matter is thrown out on the concave aspect of a rickety and bent bone. These may be all referred to the stimulus offered to nutrition in a more abundant determination of blood and nervous energy to the part, and the changes seen in the whole body

in other cases are equally the results of a more general stimulus to nutrition. Thus, in the horse we have the utmost exercise of muscle, bone, brain and nerve, and have produced animals with an extraordinary combination of these elements and of their legitimate fruits, speed and endurance. In the Leicester sheep, the Berkshire and Essex pigs, and the Shorthorn cattle, we have fostered and stimulated fat, bulk and early maturity, till we have all the energies of the system devoted to their production, and in the Ayrshires (Holsteins, Dutch Friesian, Jersey, etc., *Ed.*) we have solicited the flow of milk till the udder and accessory organs have drawn to themselves all the available powers of the being.

DISUSE OF THE PARTS.

Conversely, parts thrown out of use, waste, as witness the arm carried in a sling, the muscle on the outside of the shoulder joint sprained and disused in so-called sweeney, and the wasting of paralyzed muscles generally. Tame rabbits have the hind limbs shorter than wild ones. If Tanner is correct in saying that the lungs and liver of high-bred Durhams are lessened, it would merely indicate a result of the general tendency to lay up hydro-carbons and fat rather than burn them up for animal heat.

These five influences which I have named are well under our control; we can apply them on generation after generation, and thus increase or perpetuate many of those properties which we most desire. Other causes of variation there are which are less under our control, but which it is none the less important that we should study and avail of when occasion serves.

IMAGINATION AND VARIATION.

Under this head naturally comes up the question why the best of Laban's cattle produced a ring-streaked and spotted progeny after Jacob had set peeled rods in front of their watering troughs, and notwithstanding that all the parti-colored cattle had been carefully removed from the herd. How much was miraculous and how much a natural consequence, we don't know. That God took this means of blessing his servant does not necessarily imply that he made use of other than the already existing physiological laws, and intensified them as when he now cheers the land with an abundant harvest.

Though it is often attempted to throw discredit on the influence exercised over the child by the

imagination of the pregnant mother, yet the general opinion on this subject has undoubtedly a foundation in truth, and its importance is frequently verified by occurrences among domestic animals.

Dr. Trail, Monymusk, Aberdeen, mentions the case of a bay mare which worked, was stabled and grazed with a black gelding having white legs and face, straight hocks and long pasterns, so that the feet seemed to be set at right angles on the legs. Covered by a bay horse she produced a foal exactly like the gelding in color and shape, and especially in that of the legs.

Mr. John McGraw, Ithaca, N. Y., had a beautifully formed trotting mare covered by a horse of the same kind. The mare pastured during pregnancy in the next park to a mule, and the foal showed an unmistakably mulish aspect about the head, ears, thighs and gait.

Mr. Mustard, Forfarshire, had a black polled-Angus cow served by a bull of the same breed, but the calf was black and white, and horned like an ox with which the cow had pastured.

Mr. McCombie, of Tillyfour, had twenty polled-Angus cows served by a polled-Angus bull, and all had pure Angus calves except one, which, threatened with barrenness, had been sent to starve on another farm, where she grazed with a yellow and white ox. The calf was yellow and white.

Mr. Cruikshank, of Littyton, had twelve white calves from his roan and brown Durhams after whitewashing his steading to ward off pleuro-pneumonia in 1849. He never before had more than two in one year and always sent them away. A similar occurrence took place in a Yorkshire herd the same year.

Though this impressibility would appear to be restricted to a very small minority of breeding animals, yet its occasional existence should make us careful how we bring animals of improved breeds into intimate or exclusive relationship with stock of less desirable qualities.

This impressive state of the mental faculties in the brute may assist in explaining another phenomenon in breeding.

THE EFFECT OF THE FIRST SIRE ON SUCCEEDING PROGENY.

Hausman long ago noticed that mares bred to an ass, and subsequently to a horse, had the qualities of the ass preserved in the second and third foals. Lord Morton put an Arab mare to a quagga, and two

successive foals thereafter by a black Arab horse had striped skin, the dun color, and the short bristly mane of the quagga. So with the Hampton Court mares served by Colonel, and the following year by Actæon, the colts in the latter case bore a striking resemblance to Colonel. A polled-Angus heifer, served by a Durham bull, showed the effect on her next succeeding progeny by a polled-Angus bull, the calf being evidently a cross in shape, in color, and in having horns. (McGillivray.)

Dr. Wells, Grenada, had a flock of white ewes put to a chocolate colored, hairy ram, and next year, though served by a ram of their own breed, they produced lambs allied to the chocolate ram in color and texture of fleece.

Mr. Shaw, Lochell Cushine, Aberdeen, had part of his ewes put to a Leicester and part to a South-down ram, and the following year, though served by a horned Highland ram, the lambs showed extensively the stamp of the two polled rams in their dun faces and lack of horns.

Mr. Giles put a black and white Essex sow to a chestnut wild boar, and this sow, breeding afterward with an Essex boar, had chestnut pigs.

Among dogs the same result is notoriously frequent, though it must be confessed there are usually more sources of fallacy with these creatures.

These remarkable results may be due to mental influence alone, though it would be difficult to disprove the theory that the system of the mother is impregnated or inoculated by elements absorbed from the offspring she bears. We know nothing, it is true, of any function but secretion in the placental surface of the womb, but as absorption and secretion both take place from some other glandular surface, and as the organic germs of infectious diseases are taken up from the surface of the lungs, we cannot consider an animal membrane as an insuperable obstacle to the absorption of infinitesimal particles of living animal (germinal) matter. A third explanation may be sought in the sympathy between the functions of the ovary where the germs of the next succeeding progeny are then being developed, and the special processes going on in the womb and its contents. A striking example of this sympathy we have in the ruptured ovarian vesicles which increase and remain till after parturition in cases of pregnancy, but rapidly disappear if conception does not take place. If pregnancy influences the empty vesti-

cle why not the growing one, and with this fact before us, it is absurd to suppose that the peculiar conditions of one pregnancy will affect the ova then being developed.

But whether this theory or that is the correct one, it will not change the fact that the earlier offspring often stamps its character on the next succeeding. This is practically important to us, and knowing it we can guard against its possible evil effects.

SECTION VIII.—ATAVISM OR REVERSION. ("BREEDING BACK.")

The tendency to this is seen in all families, human and brute. The child often resembles grandparents or great grandparents, uncle or aunt, in place of its own parents. Polled-Angus, Galloway and Suffolk cattle, which are hornless, occasionally produce a horned calf. The same is frequently seen among the hornless Southdown sheep. Even the purest bred Leicesters will sometimes show patches of gray on the face, as if they had been crossed with Southdown. Black noses are far from unknown among the best bred Durhams.

Rev. Mr. Cox had a flock of spotted Spanish sheep which always bred true among themselves, but always got black lambs when crossed with Leicesters or Southdowns.

Sidney saw, in a litter of Essex pigs, the exact counterpart of the Berkshire boar used twenty-eight years before to give size and constitution to the breed.

McCombie's Durhams continue to get white calves, though none such are ever retained on the farm.

Every class of animals is liable thus at times to revert to its original type, though as shown in the case of Mr. Cox's sheep, they are more liable to do so when violently crossed than in the ordinary course of breeding from one family or from several nearly related. A second example of this was afforded in Mr. Beasley's cross between the red Highland cows and a roan Durham bull. The calves were white, with red ears, a close approximation to the aboriginal cattle found in the Chillingham and Hamilton parks.

Every breeder who would retain the special features of a particular breed must thus at times reject particular animals, however pure their pedigree. And his mind must be ever open to the liability of his stock to breed back on an extensive scale when other breeds are resorted to for fresh blood. Unless

some very desirable qualities are to be gained by the cross, the improvement in constitution and stamina will be better and more safely attained by breeding from members of the same family, whose characters have been modified by the effects of a different soil and climate.

SECTION IX.—PREPOTENCY OF RACES AND INDIVIDUALS.

And this caution in resorting to foreign blood is the more necessary that certain races and individuals have an inherent power of transmitting their own characters and fixing them permanently in their progeny to the exclusion of more desirable qualities in the breed crossed. Orton raised many chickens from a silk cock and bantam hens, but only three had silky feathers. Darwin bred from a silk hen and Spanish cock, but failed to get any fowls with silky feathers. In breeding Manx with domestic cats, seventeen out of twenty of the kittens had no tails. Among horses, Eclipse, King Herod and others have transmitted their own characters to a very extraordinary degree. Among Durhams, Hubback, Favorite, etc., have virtually created the breed. But perhaps the most striking instance of the prepotency of qualities in one individual is that reported by Hirschmann, of the crossing of Merino sheep by a native German ram. The ram had but 5,500 fibres of wool on the square inch, the third or fourth cross with the Merino ($\frac{1}{2}$ or $\frac{1}{10}$ German) had but 8,000, the twentieth cross ($\frac{1}{10801576}$ German) had 27,000, whereas the pure Merino had 40,000 to 48,000. In other words, though there remained but one part of German blood in the million, the wool was not half restored to the true Merino type.

Violent crossing is thus seen to be beset with numerous pitfalls no less to be dreaded than those of the closest *in and in* breeding. But as this prepotency is especially marked in those breeds whose characteristics have been long fixed by a careful selection or an immemorial transmission, it can often be safely availed of for the amelioration of the races. The Durham bull which met his match, as regards force and fixity of type, in the ancient Highland cow, has much more potency of type than the less carefully selected breeds, and above all, than our nondescript native cows, and will transmit his own qualities to their offspring in greater proportion than he has shared in their procreation. The question is merely one of relative fixity of character, and while to the ignorant or unwary it may offer many pitfalls, to the

intelligent and observant breeder it becomes an arm of power. Crossing a highly improved breed with an inferior one, with the view even of obtaining more vigor and stamina is a dangerous practice, but crossing a poor stock with a male of select breed, with the view of raising the character of the first, is a safe and remunerative proceeding. The progeny indeed, if afterward bred among themselves, rarely maintain the excellences of the first cross, but if steadily put to thorough-bred animals, generation after generation, they will soon come up to the standard of that race.

SECTION X.—BREEDING IN AND IN—CLOSE BREEDING.

To perpetuate and establish desirable qualities it is usually necessary to breed from close affinities. But one animal may be found possessing the property desired, and by pairing it with another, a certain percentage of the offspring will show the peculiarity to the desired extent. To these the original parent with the coveted possession must be put, and to their progeny, until the character has become sufficiently fixed.

To introduce new blood, however good in other respects, is to diminish the fixity of character. To breed in close affinities from these selected specimens is to intensify it. The advantages of such a system of breeding are patent to all, but the question arises whether it has not also its serious drawbacks if followed too far? And I fear the answer must be that it has. I have known certain strains of Cotswold sheep and Durham cattle in which extreme excellence had been attained by close breeding, but only at the expense of a troublesome taint of consumption, and many of us can recall instances of deafness and web fingers or tocs among the children of marriages between first cousins. Mr. Druce, a successful breeder of Oxford pigs, says: "Without a change of boars of a different tribe but of the same breed, constitution cannot be preserved." With the enfeebled constitution which results from persistent breeding from father and daughter, brother and sister, uncle and niece, there is also a concentration of whatever constitutional taint of disease may reside in the family. Lafosse mentions a breed of small black horses kept by a farmer in L'Aisne, and bred in and in. They were subject to specific ophthalmia, and soon the morbid taint became so concentrated that the whole family, with scarcely a single exception, was blind.

The doctrine that close breeding tends to sterility

is supported among others by Sebright, Knight, Lucas, Nathusius, Youatt, Bates, Darwin, Magne, Macknight, Madden, Spooner, Wood and Carr. The wild white cattle of Chillingham Park, Northumberland, which have had no cross since the 12th century, "are bad breeders," the annual increase being but one to five. The equally ancient race in the Duke of Hamilton's park produce but one to six. Shorthorn cows, proving barren when put to a near relation, are often fertile with a bull of another breed, or even of a distant strain of their own.

Among sheep, Jonas Webb found it needful to maintain five separate families on his farm that he might introduce fresher blood of the same family into each at certain intervals.

But pigs have, above all, shown sterility from close breeding. Mr. Fisher Hobbes found it necessary to keep three separate families to maintain the constitution and fruitfulness of his improved Essex breed. Lord Western bred from an imported Neapolitan boar and sow, until the family threatened to become extinct, and at once restored the fertility by a cross with an Essex boar. Mr. J. Wright bred from a boar and its daughter, grand-daughter and great-grand-daughter, and so on, through seven generations. The offspring in many instances failed to breed, in others they were mostly too weak to live, and those that did survive were unable to walk steadily or even to suck without assistance. The two last sows obtained in this way produced several litters of fine healthy pigs, though one of them at least had been previously served by her own sire without success. This sow was the best formed of the entire race, but there was no other pig in the litter. This case is remarkable, as showing a steady improvement in form and symmetry, advancing side by side with a steadily increasing weakness of the constitution, and of the mental and reproductive powers. Nathusius imported a pregnant Yorkshire sow and bred the progeny closely in and in for three generations, with the effect of seriously impairing the constitution and fertility. One of the last of the pure race, when bred to her own uncle, who was quite prolific with other breeds, had a litter of six, and on a second trial, one of five weakly pigs. He then had her served by an imported black English boar (which got litters of from seven to nine with his own breeds), and got a first litter of twenty-one and a second of eighteen.

The Sebright bantams closely bred were very barren, and this tendency in fowls is remarked by Wright, Clark, Eyton, Hewitt, Ballam, Tegetmeier and others.

But it will be observed that these evil results accrue from a persistent breeding from the very closest affinities. Experience has shown, in the case of our high bred cattle and sheep, that constitution and fertility may be preserved without sacrificing the breed by introducing inferior blood. The true course, in case these evil results are threatened, is to select a male of the same general family, but which has been bred apart in a sub or branch family for several generations, and if attainable, from a different locality, climate and soil. Constitution and fecundity may thus be improved without even a temporary deterioration in other respects.

SECTION XI.—DISEASE, ACCIDENT, AND INHERITANCE.

That disease, or changes the result of disease or of accident, are inherited among domestic animals, there cannot be the slightest doubt. Simple changes of structure from accidental causes are less frequently perpetuated than those giving rise to disease, and a transient disease is not likely to affect any of the progeny, but those in embryo at the time of its existence. Diseases with a constitutional taint, on the other hand, are transmitted from grandfather to grandson, though the intervening generation may have escaped.

As regards accidents and transient diseases, though the pitting of small-pox, the absence of limbs from amputation and the like, are not hereditary, yet the accidental loss of the tail in the dog, cat and horse, has determined an offspring void of tails, or with short ones. A cow which lost her horn, with supuration, afterwards, had three calves hornless on the same side of the head (Prosper Lucas). A pregnant mare of Mr. Socrates Scott's, Dryden, N. Y., had a severe inflammation of the left eye, supposed to have been caused by a burdock in the forelock. She remained blind till after the birth of a filly, and subsequently entirely recovered. The filly, now a nine-year-old mare, has the left eye undeveloped, represented by a small black mass about the size of a field bean, and quite opaque. The dam, after having recovered her sight, bore four colts with perfect eyes, and the mare with the undeveloped eye has equally given birth to several whose eyes were sound. Brown-Sequard found that Guinea pigs, in which he

had produced epilepsy by an operation, afterward brought forth litters subject to the same malady,—which is otherwise very rare in this species. Unusual as such cases are, they show the greater tendency to transmit a defect when accompanied by disease. Those diseases that are habitually transmitted are much more important.

The specific inflammation of the eyes in horses is notoriously hereditary. Its prevalence in England is much more limited than it was fifty years ago, when less care was taken by breeders to reject animals the subjects of this infirmity. In many parts of Ireland and America blindness seems to doom a mare to breed, mainly because she is less fit for anything else; and I regret to say that blindness is a remarkable feature of the Irish and American horses alike. Stop the stream at its fountain and in ten years the land would be stocked with a sounder-eyed and more serviceable horse.

I knew a Clydesdale mare with feet preternaturally small, and kept tender by faulty shoeing, and of her four foals two had feet so small and weak that they were practically useless, while the remaining two, though born with well-formed feet, afterward fell victims to founder and were ruined.

Bony growths on the limbs (splints, spavins, ring-bones, sidebones) are so frequently hereditary that a rule may be laid down to that effect. This is often due to faulty conformation, as want of breadth, bulk and strength of the joints, upright pasterns causing jarring and concussion, or to faulty direction of the limbs and feet, natural or acquired, but in some cases it appears due to an inherent constitutional tendency to bone disease, rheumatic or otherwise. Rheumatism in cattle and sheep is notoriously hereditary, and it is to be regretted that the taint is shown in some of our very best families.

Heaves (broken wind) tends to be hereditary from want of chest capacity or a gluttonous appetite, as well as from a transmitted proclivity. Roaring is often hereditary from the badly set on head or want of breadth between the lower jaw, as well as from a constitutional tendency. An instance is on record of a stallion which got sound stock, till he contracted roaring at ten years old, and nearly all his stock, got after this date, became roarers at the same age.

To recount all the maladies which may be transmitted would be to enumerate nearly all the diseases which flesh is heir to, but chief among these as most

likely to be inherited, are those with a distinct though perhaps latent constitutional taint, and to this class belong rheumatism, consumption, scrofula, specific ophthalmia, and diseases of the bones and joints. It is rarely advisable to breed from any animal suffering at the time from any active disease, but those points would be valuable indeed which should persuade us to breed from an animal in whose person or family the tendency to any of the class of specific constitutional diseases named has been strongly manifested.

As to the mode of transmission it is perhaps idle to offer an opinion. We know that the germs of the future being, ovum and spermatozoa, have in them the elements capable of developing into elaborate organisms similar in nearly all points to their ancestors, and it is no more nor less difficult to conceive of the reproduction from these elements of size, shape, color, functional powers of secretion, etc., than of the disease to which the ancestors were subject. Whether, as Darwin supposes, the original germs are composed of myriads of infinitesimal living particles, many of which may remain quiescent and inactive during one or two generations but be roused into activity and reproduce themselves in the third, or whether all the living germinal matter of germ and body is tainted with this hereditary malady, it boots little to inquire. That the germs contain it we know, and that it will reappear in the product of these germs or in his descendants we equally know. Knowing this we can safely strike at the root of the tree and prevent the development of the evil fruit.

SECTION XII.—RESPECTIVE INFLUENCE OF SIRE AND DAM ON THE PROGENY.

While all agree that both parents impress their respective characters on the progeny, much discussion has arisen with regard to the relative influence of the male and female on the young organism, and what parts and properties each most powerfully controlled. Whether the male wields the most potent influence, as the common practice of breeding from otherwise useless females might imply, may well be questioned. We have already seen that that parent, of either sex, which has the strongest constitution, enjoys the more vigorous health, and belongs to a breed whose characters are more permanently fixed, will exercise more influence over the progeny than the parent in which these characters are deficient or wanting.

And the customary attention given to the selection of a sire usually secures these. But eliminate these and we shall see among our domestic animals, as we now see among the families of our friends, that the male parent must share pretty equally with the female one the credit of the family. The Arabs indeed, no mean judges if experience and success afford any criterion, esteem the qualities of the mare as much more important than those of the horse. Thoroughbred Arabian stallions are common, but whoever persuaded an Arab to sell his favorite mare? If we can obtain tolerable animals by selecting as one of the parents an animal of good quality and pedigree, how much better must they be if both are of this stamp.

As regards the parts whose formation is controlled by the different parents, the most generally received doctrine is that the male has the most potent influence on color, skin, hair, head, ears, neck and locomotive system generally, while the female tends to control the size, the internal organs and the constitution.

This idea seems to have been suggested to Buffon by the brown hair, short, thin neck, quadruple udder, and long legs of his nine hybrids between the he-goat and ewe. Also to Flourens by the fur of his hybrids between the jackal and bitch. Richard Booth is said to have acted under this idea in producing his unsurpassed breed of Shorthorns. But Mr. Orton was the first to truly state the doctrine and defend it. He saw that the mule resembled the jackass, his father, in his main external characters, but approaches the mare in size, stamina and energy; conversely, that the hinny is externally like its father, the horse, but in size, sluggishness and want of vigor more closely allied to the donkey; that the cross between the hemione and she-ass at the *Jardin des Plantes* had the external characters of the male parent mainly, and that the crosses between certain breeds of fowls presented the same characters. The exceptions to the rule are neither few nor slight, yet results so frequently accord with it in the ordinary course of breeding, that we cannot, I think, afford to look on them as purely accidental. While withholding a full assent thus to the broad doctrines of Orton, I still think them sufficiently well founded to guard us against breeding from mare, cow or ewe, with an insufficient development, weakness, or unhealthy taint affecting the internal organs; or

from any male deficient in nervous energy and vigor, and above all, *fully* or predisposed to disease in his locomotive organs. It does not follow that a female may be used with these latter failings, nor a male with the former. An animal of either sex is likely to transmit any fault it may possess, but failings of the nature I have indicated should be specially guarded against.

BREEDING OF MALES AS A SPECIALTY.

As we have seen, the male of a highly improved breed usually impresses the progeny in a higher ratio than the less improved female. The male, too, can more quickly cross a whole flock than the female, which can only yield two or three increase yearly. Hence the importance of raising males specially for breeding, and bringing them to the highest possible state of excellence. And wherever this plan is adopted we see the beneficial effect on the enhanced value of the progeny. Examples might be cited among thoroughbreds and trotters, Durhams, Jerseys, Ayrshires and Devons, but they are specially remarkable among sheep. The best Cotswold ram raised by Wells, Beale Browne and others, on their native hills, and the finest Leicesters will readily let at auction for the season for £20 to £40 per head. And the successful bidder finds his profit in paying these high prices rather than in perpetuating inferior qualities in his flock. He reaps his reward, as any one who will examine his flock and his yearly balance sheet will not fail to see.

SECTION XIII.—REGULATING THE SEX OF OFFSPRING.

Could such breeders of males succeed in obtaining male and female stock at will, their specialty might be made more satisfactory and remunerative. It is often equally desirable to secure a majority of females in the offspring. No wonder then that men's minds have been in all ages exercised with this question of regulating the sexes. Many rules have been laid down for this purpose, but the great majority are self-evidently absurd, while the remainder are but of very questionable value. I will mention a few of the most reasonable of the hypotheses: [None yet have been proved. *L.P.*]

1. The desires and ideas of the parents at the time of conception determine the sex.
2. The nature of the food of the parents, and particularly of the mother during pregnancy.

3. The manner in which the spermatic artery is given off from the aorta.

4. The male germ is supplied by the right testicle or ovary, and the female from the left.

5. The full age and greater strength and vigor in one parent, will secure its sex in the majority of the offspring.

6. The ovum impregnated just after the rupture of its ovarian vesicle will be a female, while that impregnated later in the lower part of the Fallopian tube will be a male.

7. The persistent selection of females, for breeding purposes, which yield one sex mainly, will finally obtain a race producing mainly males or mainly females.

Concerning the influence of the mother's wishes, we have some of us known instances of a strong conviction and desire on the part of the mother, during pregnancy, being fulfilled and verified in the birth of a son or daughter. But how often is the opposite also the case?

Giron de Buzareingues alleges that more females are born when the mothers are well nourished and left in repose than when worked and on spare diet. This question ought to be easily settled by some of our southern breeders, accustomed to the forcing system.

The supposed effect of the variable origin of the spermatic arteries and the alleged male and female characters of the right and left testicles are unworthy of serious remark. Even the authority of the father of medicine, and his curious instructions for binding up the right or left testicle according to the sex desired, will not overrule the fact that males and females with single testicles and ovaries are capable of producing both sexes.

Leroy, Giron and Colin agree that the more fully developed and vigorous the male as compared with the female, the more males will appear in the offspring, and conversely, that a strong female served by a weak male will have more female offspring. This they observed on dogs, but much more conclusively on sheep. The full-grown, strong and vigorous ewes with a young or weekly ram, brought forth a majority of females, and the union of a full-grown, robust ram, and old, weak, or diseased ewes, yielded a preponderance of males. Hofacker says he has noticed the same thing in the human subject, and Saddler's "English Peerage" appears confirmatory of

the theory. Burdach has observed a greater proportion of male progeny than female, from the most prolific women, but whether from weakness caused by child bearing, may be open to question. Presuming the theory to have some basis in truth, it may serve to explain a predominance of female offspring among domesticated gregarious animals, as the females are better fed and have less exertion than their wild compeers, and the male may be presumed to be, in many cases, weakened during the breeding season, by excessive use.

Lastly, Professor Thury, of Geneva, upholds the doctrine that the ovum impregnated at an early and comparatively undeveloped stage becomes a female, whereas if more fully developed before impregnation, the product is a male. Huber's observation, that the queen bee lays first female eggs, then males, and lastly again females, he explains by the theory, the first eggs are not fully developed when laid and impregnated, that the second lot laid later have had more time to undergo full development, while the last laid are but partially developed on account of the comparatively exhausted condition of the oviduct. Under his instructions, George Cornaz, an intelligent agriculturist in Vaud, applied the principle to breeding cattle. He had twenty-two Swiss cows served by a Durham bull on the first signs of heat, and all brought forth heifers. He had six Swiss cows served in the last stages of heat, by the same bull, with the view of raising work oxen, and all produced bull calves. He had an imported Durham cow served, the last day of heat, to obtain a pure successor to his valuable Durham bull, and his wishes were crowned with success. This looks like solid ground, but alas! subsequent experiments made by Coste and others, on cattle, rabbits, birds, frogs and fishes, have given uncertain and contradictory results. It is difficult to set aside altogether the results obtained by Cornaz, and, on the whole, there is probably some truth at the foundation of the theory, but even if so, it must be granted that modifying circumstances will often, if not usually, set aside the rule.

And lastly, the proposal to breed in and perpetuate the tendency to produce young of one sex only, though exceedingly plausible in what it offers, will probably prove still more worthless. I am not aware that the attempt has been made to perpetuate such a power in the lower animals, but my own

observations on human families are altogether unfavorable to its success. One family of six daughters, all married and all prolific, had each about an equal number of sons and daughters; and another family of seven daughters and one son, have so far had families equally well balanced as regards the sexes.

SECTION XIV. — SUMMARY OF GENERAL PRINCIPLES.

To recapitulate, we have seen: —

1. That a perfect development and a sound and vigorous health, constitutionally, and above all locally in the generative organs, are condition of fertility.

2. That in the maintenance and improvement of a breed the truth that like produces like, that the reproductive germ, ovum or spermatozoon will stamp upon the animal developed from it the characters of the parent organism, is the backbone of all success.

3. That we can, in a great degree, at will, produce variations and improvements in breeds, as by an abundant feeding, a mild, salubrious climate, a rich, healthy soil, a moderate use, education, stimulation or selection of desirable qualities. A disuse or rejection of undesirable characters and properties, by soliciting the weight of imagination in our favor, by allowing the breeding animals to mix only with those of the stamp desired, by crossing less improved breeds systematically by males of a better race, by crossing animals faulty or deficient in some particular point with others in which this point is developed in excess.

4. That the herding together of pregnant high-class animals and low-bred ones, and above all, attachments formed between the two races, is to be specially avoided, as occasionally affecting the progeny injuriously, and that strong mental impressions from a new or unusual condition of surrounding objects are to be equally avoided.

5. That if the valuable female is allowed to breed to an inferior male she cannot be relied upon to produce pure bred animals for several succeeding pregnancies thereafter. Through a strong and retained mental impression, through an absorption into her system of living particles (germinal matter) from the fetus, or through some influence during pregnancy on those ova then being most actively developed, the good or bad features of the first sire are perpetuated in the progeny of succeeding ones.

6. That all breeds show a tendency to breed

back or produce an offspring bearing the marks of their less improved and comparatively valueless ancestors, so that individuals of this kind must be rejected from the best breeds if we would maintain their excellence.

7. That certain races and individuals have their characters more fixed, and will transmit and perpetuate them in greater proportion than others with which they may be crossed, so that if their qualities are desirable ones, they prove highly valuable in raising other stock to higher excellence. If undesirable, on the other hand, they will, as in the case of the coarse-wooled German ram, depreciate the value of any stock crossed for many generations. That fixity of type, however, is above all a characteristic of those races which have been carefully selected and bred up to a certain standard for many generations, so that in our best, longest established and most esteemed breeds, we have a legacy of the most valuable kind left us by the successful breeders of the past, with which we may mold our inferior races almost at will.

8. That while breeding continuously from the nearest relations tends to a weakened constitution, the aggravation of any taint of disease in the blood and sterility, yet that these may be avoided by infusing at intervals fresh blood of the same family, but which has been bred apart from this branch of it for several generations. That, moreover, the highest excellence is sometimes only attainable by breeding very closely for a time.

9. That diseased or mutilated animals are generally to be discarded from breeding. That mutilations resulting in disease, that disease existing during pregnancy, and disease with a constitutional morbid taint, are above all to be dreaded as transmissible.

10. That there is some foundation for the opinion that the sire tends to contribute more to the locomotion and external organs, nerve and vigor, and the dam to the size and internal organs, so that if we cannot obtain the greatest excellence in both, we should, at least seek to have each unexceptionable in the parts and qualities attributed to it.

11. That with regard to the controlling of the production of sexes, while the Creator has made them at first male and female, and will probably continue to do so irrespective of our meddling, yet there is reason to believe that certain conditions of

the parents influence the sex of the progeny to a perceptible degree. If the feminine element in the progeny is increased by rendering the system of the mother more soft, lax, and adipose by high feeding and want of exercise, by the strength and vigor of the female as compared with the male, and perhaps even by having the females put to the male on the earliest symptoms of heat; and if the male element is increased by the greater strength and vigor of the sire as compared with the dam, and perhaps even by having the female served only as the heat is passing off, we need not despair of increasing at will the number of females or males in our stock, but ordinary mortals must not expect the success which attended the efforts of Thury and Cornaz.

CHAPTER X.

THE VALUE OF PEDIGREE.

SECTION I.—DEFINITION OF PEDIGREE.

A well authenticated pedigree is an assurance that the animal has been bred in the recorded lines. No pedigree, however, gives an absolute guarantee either of value or fitness for a particular purpose. It is an assurance, however, that an animal is desirable as a breeder, and just in proportion to the purity of the line in which the animal is bred. It is evidence of the known reputation of the ancestry, of the known honesty of the breeder, under the restrictions of the herd book, and hence to the buyer assures safety in his breeding, that the lines will continue as heretofore, so far as human correctness can accomplish.

Yet pedigrees to be good must produce good animals. They will do so if discretion is used. What the farmer wants is good feeding animals that will mature early, and make heavy, fleshy cattle. He is not so much interested in show cattle; he must have constitution. Hence in breeding grades he should select a sire with strong constitutional vigor, even at the expense of elegance. Then four or five crosses will bring his stock fully up to the standard of the ordinary thoroughbred.

One special value of the pedigree or record is that in animals it shows distinctly, or should do, the particular line of breeding back to the two original animals forming the artificial cross in the case of animals of mixed original breeding, or in the case of pure breeds, as in the Devon, for instance. It should descend through animals of well attested

purity of blood. Then the greater number of animals embraced of superior excellence in certain lines the better the pedigree.

PECULIARITIES IN BREEDS AND FANCY POINTS.

Peculiarities of color or form that do not represent value are merely fanciful. Specific breeds have not only specific forms but also specific colors. The red and white, or roan, of Shorthorns; the white faces of Herefords; the dark, uniform bay color, and white switch of the tail of Devons; the solid color and black points of Jerseys; the pure white with pure black in Holstein or Friesian; the solid black and polled characteristic of Aberdeen-Angus; the fine bristles of swine—these mark value. Special lines of color in a breed, and especially wrinkled Merinos; these are mere fancy points, in the latter especially injurious, as blending different grades of wool in the fleece thus diminishing the value of the fleece to the manufacturers.

Peculiarities, however, that are characteristic of a breed are of value as constituting positive excellence. It is valuable as indicating excellence through heredity connected in the breed or family and perpetuated constantly through the blood lines of the breed, as early maturity, excellence of beef, great milking qualities, or excessive richness of milk in cattle. Stoutness of bone and musculature; eminent style and action, or great weight in the horse. Aptitude to fatten and vigor in swine. And mutton making qualities and peculiarities of wool in sheep. All these are valuable and strictly hereditary qualities.

SECTION II.—FORMS OF PEDIGREES.

Dr. Manly Miles, when professor of agriculture at the Michigan Agricultural College, in his work, "Stock Breeding," compiled from the various herd books and records accurate descriptions, which we excerpt as showing various forms of pedigrees, for those who have not seen his valuable work. These are as follows:

SHORT-HORN FORM.—"(14837) LORD OF THE VALLEY.

Red, calved August 30, 1856, bred by Mr. R. Booth, Warlaby; got by Crown Prince (10087), dam Red Rose by Harbinger (10297), g. d. (Medora) by Buckingham (3239), gr. g. d. (Monica) by Raspberry (1875),—(White Strawberry) by Rockingham (2551),—by Young Alexander (2977),—by Pilot (496),—by the Lame Bull (359),—by Easyby (232), by Suwarro

(639)."—("English Short-Horn Herd-Book," vol. xii, p. 187.)

"9798 DUKE OF AIRDRIE. (12730)

[The original progenitor of the American Dukes of Airdrie, called in Kentucky "The Old Duke."]

Red and white, bred by R. A. Alexander, Airdrie, Scotland, and imported to his farm in Woodford county, Ky., calved August 4, 1851, got by imp. Duke of Gloster, 2763 (11382), out of Duchess of Athol, by 2d Duke of Oxford (9046),—Duchess 54th, by 2d Cleveland Lad (3408),—Duchess 49th, by Short Tail (2621),—Duchess 30th, by 2d Hubback (1423),—Duchess 20th, by 2d Earl (1511),—Duchess 8th, by Marske (418),—Duchess 2d, by Ketton 1st (709),—Duchess 1st, by Comet (155),—by Favorite (252),—by Daisy Bull (186),—by Favorite (252),—by Hubback (319),—the Stanwick cow, by J. Brown's Red Bull (97)."—(Allen's "American Short-Horn Herd-Book," vol. x, p. 107.)

Numbers in parentheses refer to "English Herd-Book," open numbers to the "American Herd-Book." There were formerly several Herd-Books and Records. They have now all been consolidated in one, The American Short-Horn Herd-Book.

HEREFORD FORM.—"976 COTMORE, W. F.

Calved 1836, bred by the late Mr. T. Jeffries, by Old Sovereign (404), dam by Lottery (410). At Mrs. Jeffries's sale, 1844, Cotmore was bought in for £100; he won, at different times, the prizes for two-year-old, three-year-old, and aged bulls at Hereford; and the first prize for Hereford bulls at the meeting of the Royal Agricultural Society at Oxford; Cotmore's dam, at the Grove sale, 1844, was sold for £33."—"The Herd-Book of Hereford Cattle," vol. i, p. 52. See page 164 for extended pedigree.)

"(3434)

SIR CHARLES.

Red with white face, calved February 14, 1867; bred by and the property of Mr. F. W. Stone, Moreton Lodge, Guelph, Canada; got by Guelph (2023), dam (Graceful) by Severn (1382), g. d. (Lady) by Albert Edward (859), g. g. d. (Zephyr) by Walford (871),—(Friday the Second) by Wonder (420)—(Friday) by Commerce (354),—(Pretty Maid) by The Sheriff (356),—(Sovereign) (404)."—("Herd-Book of Hereford Cattle," vol. vii, p. 125.)

The cows in all the above cases are identified by the name of their sire following their own; w. f. after Cotmore means white face; in the first volumes

of the "Hereford Herd-Book" this abbreviation was used, as also m. f. for mottled face, g. for gray, etc.

DEVON FORM—"PRINCE OF WALES (105).

Referred to as Quartly's Prince of Wales; calved in 1843, bred by James Quartly, the property of Earl Leicester. He won the 1st prize as best young bull in 1844, and 1st prize as best old bull in 1845 at Exeter, and 1st prize in class 2 at the R. A. M. at Shrewsbury. Sire, Prince Albert (102); grandsire, Hundred Guinea (56); dam Duchess (146) by Hundred Guinea (56); grandam Lilly, by a son of Forster (46), out of Long-Horned Curly, bred by Mr. F. Quartly.—"Davy's "Devon Herd Book," vol. i, p. 26. See page 149 for the same pedigree in tabular form.)

"466 EVELEEN 5TH.

Calved March 14, 1862; bred by the late Edward G. Faile, West Farms, N. Y.; the property of Michigan State Agricultural College, Lansing, Mich.

Sire *Cayuga* (602) (587 E); 2d sire, Tecumseh (567) (535 E); 3d sire, Frank Quartly (205), imported; 4th sire, Earl of Exeter (38); 5th sire, Baronet (6).

Dam, imported *Eveleen* (691), bred by Mr. George Turner, of Barton, England, by Earl of Exeter (38); 2d dam, Ruby (1085), by Favrite (43); 3d dam, Pink (952), by a son of Pretty Maid (366), and Watson (129); 4th dam, bred by Mr. John Halse.—"American Devon Herd-Book, vol. ii, p. 105.)

In Devon pedigrees "The figures in parentheses with the letter E, thus, (00 E), refer to Davy's third volume of 'English Devon Herd-Book.' The figures in parentheses, thus, (00), refer to Davy's first and second volumes, and Howard's third volume;" while in references to the "American Devon Herd-Book" the figures are not inclosed in parentheses.

This complication in the numbers designating recorded animals arises from the simultaneous publication, in England and America, of a third volume of pedigrees, the numbers in each being a continuation of the numbers in the first and second volumes of the "English Herd-Book." There are therefore two so-called third volumes of the "Devon Herd-Book," one English, a continuation of Davy's original series, and the other American, known as Howard's third volume.

After the publication of the latter an "Association of Breeders" started an American "Devon Herd-

Book," in which the American pedigrees are now recorded.

AYRSHIRE FORM—"668 FETTIE.

Light red with a little white; calved May 13, 1863; bred by Henry H. Peters, Southboro, Mass.; owned by Prof. Manly Miles, Lansing, Mich.

Sire, Eglinton, 21. Dam, Ruth, 103."

(American "Ayrshire Herd-Book," vol. ii, p. 102.)

The sire and dam only are given here, and reference to the record under their numbers is necessary to extend the pedigree.

There are now three "Ayrshire Herd-Books" published in America; but we need not give examples of pedigrees from all of them, as the system of recording is essentially the same, the cows as well as the bulls having a distinguishing number.

JERSEY FORM.

The pedigrees in the record of the "American Jersey Cattle Club" are published in tabular form; the sire and dam, each with a distinguishing number, are alone given. The headings are:

No.—Name—Color and distinguishing marks—By whom bred or imported—When dropped or imported—From what place, in what vessel—Present or last owner—Sire—Dam.

SECTION III.—TO READ AND VERIFY A PEDIGREE.

In the record of the pedigree we first find the name of the animal, whom bred by, and when calved or by whom imported. Then comes the name of the sire and the number. To trace this the herd book in which this is recorded must be taken, and the parentage of the sire traced; then of the dam, and so successively through each recorded ancestor back and back, to the original sire. The dam is to be traced the same way, and all these blood lines tabulated for inspection and verification if forgery or fault is suspected. As a rule the fact that an animal is recorded in an authentic herd book is sufficient. There may be errors. These may be traced.

SECTION IV.—GOOD AND BAD PEDIGREES.

A pedigree shows or is intended to show exactly the blood lines of an animal. This will give value to the animal just in proportion to the value of those animals from whom it inherits blood. Some animals unite exceeding goodness with the prepotent quality of infusing their excellence for generations. This is the most essential, and if such lines run in a pedigree it adds immensely to the value of the animal. If, on the other hand, an inferior animal has

been used whose propotense is in the direction of irregular or inferior quality in the progeny, animals with this trace should be carefully avoided. These points, however, interest the scientific breeder rather than the general farmer.

CHAPTER XIX.

VALUABLE TABLES AND ITEMS.

SECTION I.—THE STUDY OF TABLES.

Tabulated matter is considered dry reading. The value lies in the manner in which condensed information is presented to the eye and the ease with which comparisons may be made therefrom. In this light they are among the most valuable in their practical information in any special department of study to which they pertain. Let us take the gestation of

animals. It has been treated of in the body of the work. In this chapter we give a table of the gestation of animals. The table given below embraces all the animals of the farm of both sexes, and some not generally kept. The appropriate columns show—

1. The kind of animal.
2. The proper age for reproduction; the period of the power of reproduction.
3. The proper number of females one male should serve in one season.
4. The proper or most favorable season for copulation.
5. The period of gestation and incubation, including the shortest, the average and the longest period observed in a great number of trials.

TABLE OF GESTATION, INCUBATION, REPRODUCTIVE POWER, ETC.

KINDS OF ANIMALS.	Proper Age for Reproduction.	Period of the Power of Reproduction.	Number of Females for one Male.	The most Favorable Season for Copulation.	Period of Gestation and Incubation.		
					Shortest Period.	Mean Period.	Longest Period.
		Years.			Days.	Days.	Days.
Mare	4 years.	10 to 12		May.	322	347	419
Stallion.....	5 "	12 to 15	20 to 30				
Cow.....	3 "	10		July.	240	283	321
Bull.....	3 "	5	30 to 40				
Ewe.....	2 "	6		Nov.	146	154	161
Tup.....	2 "	7	40 to 50				
Sow.....	1 "	6		March.	109	115	143
Boar.....	1 "	6	6 to 10				
She-Goat.....	2 "	5		Nov.	150	155	163
He-Goat.....	2 "	6	20 to 40				
She-Ass.....	4 "	10 to 12		May.	365	380	391
He-Ass.....	5 "	12 to 15					
She-Buffero.....					281	308	335
Bitch.....	2 "	8 to 9		Feb.	55	60	63
Dog.....	2 "	8 to 9					
She-Cat.....	1 "	5 to 6			48	50	56
He-Cat.....	1 "	9 to 10	5 to 6				
Doe-Rabbit.....	6 months	5 to 6		Nov.	20	28	35
Jack-Rabbit.....	6 "	5 to 6	30				
Cock.....	6 "	5 to 6	12 to 15				
Turkey, sitting } Hen.....					17	24	28
on the eggs } Duck.....					24	27	30
of the..... } Turkey.....					21	26	30
Hen, sitting on } Duck.....					26	30	34
the eggs of the } Hen.....		3 to 5			19	21	24
Duck.....					28	30	32
Goose.....					27	30	33
Pigeon.....					16	18	20

TABLE OF NUTRITIVE EQUIVALENTS, ETC.

KINDS OF FOOD.	Standard per cent.	Nitrogen per cent—dry	Nitrogen per cent—not dried	Standard
Ordinary natural meadow hay.....	11.0	1.31	1.15	100
Ordinary of fine quality.....	14.0	1.30	1.30	98
Ordinary select.....	12.2	2.40	2.00	58
Ordinary, freed from woody stems.....	14.0	2.44	2.10	55
Lucerne hay.....	16.0	1.66	1.34	23
Red clover hay, second year's growth.....	10.1	1.70	1.54	73
Red clover cut in flower, green, second year's growth.....	76.0	0.64	0.61	311
New wheat straw.....	26.0	0.36	0.27	426
Old wheat straw.....	8.5	0.53	0.40	235
Old wheat straw, lower parts of the stalk and ear.....	5.3	0.43	0.41	280
New rye straw.....	9.1	1.42	1.33	86
Old rye straw.....	18.7	0.30	0.24	479
Oat straw.....	12.6	0.50	0.42	250
Barley straw.....	21.0	0.36	0.30	383
Pea straw.....	11.0	0.30	0.25	460
Millet straw.....	8.5	1.95	1.79	64
Buckwheat straw.....	19.0	0.90	0.78	147
Drumhead cabbage.....	11.0	0.54	0.48	240
Swedish turnip.....	92.3	3.70	0.28	411
Turnip, white.....	91.0	1.83	0.17	676
Field beet, marigold.....	92.5	1.70	0.13	885
Field beet, Silesian.....	87.8	1.70	0.31	548
Carrots.....	85.6	1.43	0.18	669
Jerusalem artichokes, white.....	87.0	2.40	0.30	382
Jerusalem artichokes, red.....	79.2	1.60	0.30	348
Potatoes.....	75.5	2.20	0.42	274
Field beans.....	65.9	1.50	0.36	319
White peas.....	7.9	5.50	5.11	....
New Indian corn.....	8.6	3.20	3.54	....
Buckwheat.....	18.0	2.00	1.64	....
Barley.....	12.5	2.40	2.10	....
Barley-meal.....	13.2	2.02	1.70	....
Wheat.....	13.0	2.46	2.14	....
Wheat.....	10.5	2.33	2.09	....
Brn.....	37.1	2.18	1.36	....

Proximate principles of Indian corn compared
with the other cereal grains:

100 PARTS OF	STARCH.	Gluten and other azo- tized matter.	Dextrine, etc.
Wheat.....	58.12	22.75	9.50
Rye.....	65.65	13.50	12.00
Barley.....	65.13	13.96	10.00
Oats.....	60.54	14.38	9.25
Indian corn.....	67.55	12.50	4.00
Rice.....	89.15	7.05	1.00

100 PARTS OF	Fatty matters.	Cellulose.	Mineral matter and salts.
Wheat.....	2.61	4.00	3.02
Rye.....	2.15	4.10	2.60
Barley.....	2.76	4.75	3.10
Oats.....	3.50	7.00	3.25
Indian corn.....	8.80	5.90	1.25
Rice.....	.80	3.00	.90

ECONOMICAL FEEDING VALUES.

DRY STATE.	Red Clover.	White Clover.	Lu- cerne.
Flesh formers.....	22.55	18.76	12.70
Fat formers.....	41.00	40.00	38.00
Accessories.....	21.00	30.00	36.00
Mineral matter.....	9.45	11.25	13.24

ECONOMICAL FEEDING VALUES.

	Grass.	Meadow hay.
Water.....	68.23	11.61
Flesh producing or nitrogenized substances.....	4.86	8.14
Fat producing or non-nitrogenized substances.....	11.15	43.63
Woody fiber.....	12.60	27.16
Ash.....	2.86	6.16
	100.00	100.00

PROXIMATE PRINCIPLES OF CLOVER—ECONOMICAL FEEDING
VALUES.

GREEN STATE.	Red Clover.	White Clover.	Lu- cerne.
Water.....	76.0	80.0	75.0
Starch.....	1.4	1.0	2.2
Wood fiber.....	13.9	11.5	14.3
Sugar.....	2.1	1.5	0.8
Albumen.....	5.0	3.4	1.9
Extractive matter and gum.....	3.5	3.4	4.4
Fatty matter.....	0.1	0.2	0.6
Phosphate of lime.....	1.0	0.9	0.8

ECONOMICAL FEEDING VALUES.

GREEN STATE.	Red Clover.	White Clover.	Lu- cerne.
Water.....	76.0	80.0	75.0
Flesh formers.....	2.0	1.5	1.9
Fat formers.....	3.6	2.7	3.6
Accessories.....	17.4	14.0	18.7
Mineral matter.....	1.0	0.9	0.8

COMPARATIVE VALUE OF FOODS.

	Value by Analysis.	Value by Experiment.
Good hay.....	100	100
Red clover hay (well cured).....	77	95
Rye straw.....	502	355
Oat straw.....	304	220
Ruta-bagas.....	676	262
Field beets.....	391	346
Carrots.....	412	280
Potatoes.....	324	195
Beans.....	20	46
Peas.....	30	44
Indian corn.....	70	56
Barley.....	65	51
Rye.....	98	49
Oats.....	60	59
Buckwheat.....	74	64
Wheat.....	47	43
Linseed oil-cake.....	22	64

PROXIMATE PRINCIPLES, BUTTER, CHEESE, ETC.

DESIGNATION.	Water.	Ash.	Fat.	Caseino etc.
Jersey butter.....	11.20	3.20	84.76	0.75
Factory butter.....	12.36	2.98	83.41	1.25
Whey-butter.....	8.82	3.43	87.75	....
	9.77	1.67	88.56	....

DESIGNATION.	Water.	Ash.	Fat.	Caseino sugar, etc.
New York factory-cheese.....	No. 1 31.41	3.53	37.88	27.18
	No. 2 35.68	3.60	35.15	25.57
	No. 3 35.24	3.23	35.08	25.83
	No. 4 33.75	4.05	35.57	26.65
Mass. factory-cheese.....	No. 1 34.16	3.02	33.92	28.88
	No. 2 38.5	3.73	31.19	26.58
Maine factory-cheese, Jersey milk.....	28.11	2.71	41.03	28.15
Wisconsin factory cheese.....	35.49	3.34	34.05	26.12

DESIGNATION.	Water.	Ash.	Fat.	Caseino etc.
Common skim-cheese.....	42.38	4.63	20.55	33.44
Scalded milk and buttermilk cheese.....	44.18	4.50	15.22	45.80

DESIGNATION.	Water.	Ash.	Fat.	Caseino etc.
Oleomargarine-cheese.....	40.56	3.98	20.43	36.97

TABLE ON GESTATION OF COWS.

This table gives the number of relative days of gestation, the number of cows calving on given days, also cow calves, bull calves, twin cow calves, twin bull calves and twin cow and bull calves:

Number of days of gestation.	Cows.	Cow calves.	Bull calves.	Twin cow calves.	Twin bull calves.	Twin cow and bull calves.
220	1		1			
226	1	1				
233	1		1			
234	1		1			
235	1	1				
239	1	1				
242	1		1			
245	2	2				
246	2		2			
248	1	1				
250	1	1				
252	2		2			
253	1		1			
254	1	1				
255	2		2			
257	2	1	1			
258	3	1	2			
259	1		1			
262	1		1			
263	2		2			
266	1			1		
268	2	2				
269	2		1		1	
270	5	2	1	1		1
271	6	5	1			
272	8	1	1		1	
273	8	2	1			
274	5		5			
275	5	2	2		1	
276	15	7	6		1	1
277	14	10	2	1		1
278	18	11	4	1		2
279	32	16	11	3		2
280	35	15	20			
281	39	20	18			1
282	47	26	20	1		
283	54	30	24			
284	66	33	33			
285	74	29	43			2
286	60	22	38			
287	52	25	27			
288	42	13	28		1	
289	45	20	25			
290	23	10	18			
292	16	5	11			
293	10	1	9			

Number of days of Gestation.

Cows.

Cow calves.

Bull calves.

Twin cow calves.

Twin bull calves.

Twin cow and bull calves.

294	8	1	7			
295	7	3	4			
296	6	2	4			
297	2	1	1			
299	1		1			
304	1	1				
305	1	1				
306	3	3				
307	1	1				
318	1	1				

PROXIMATE PRINCIPLES OF MILK.

The milk of the Holstein cattle among the first imported is taken—first, because the analysis was made by the chemist of the Department of Agriculture, and hence authoritative; and, second, because it represents as nearly as possible the normal constituents of the average and milkers from native breeds. The analyses were made in 1868-69. One thousand parts by volume afford the following weights of constituents in samples:

	No. 1.	No. 2.	No. 3.	No. 4.
	Texe-laar.	Lady Mid-would.	Zuider Zee.	Maid of Op-perdoes
Water (produced).....	850.20	879.30	874.40	869.5
Caseine and albumen.....	55.40	38.15	48.01	49.64
Sugar and salt.....	44.40	44.54	42.04	36.73
Pure butter.....	47.50	33.98	32.50	40.25
Phosphates.....	2.50	3.75	3.05	3.75
	1,000	1,000	1,000	1,000

OBSERVATIONS BY THE CHEMIST.

These milks, and especially No. 1, contain a larger quantity of albuminous matter than any samples which I have analyzed. This substance, found in all good milk, cannot be separated from the caseine so as to enable us to weigh it, and I have been compelled to include it with the caseine found. The albuminous substance is not only highly nutritious as a diet, but in the cases of these samples it confers a singular constitution on the milk, considered as an organized secretion. It divides the pure fatty part of the milk in a way to prevent it from rising in the form of cream copiously, and holds a part of it in what would be the skimmed milk, rendering it necessary, in order to obtain all the butter, that the *milk*, instead of the *cream*, should be churned. But its office has a more important connection with the ac-

CAL FEEDING

White lover.	Lu- cerne.
80.0	75.0
1.0	2.2
11.5	14.3
1.5	0.8
1.5	1.9
3.4	4.4
0.2	0.6
0.9	0.8

White lover.	Lu- cerne.
80.0	75.0
1.5	1.9
2.7	3.6
14.9	18.7
0.9	0.8

Value by
Experiment.

100
95
355
220
262
346
280
195
46
44
56
51
49
59
64
43
64

, ETC.

Fat.	Caseine etc.
4.76	0.75
3.41	1.25
87.75	
88.56	

Fat.	Caseine sugar, etc.
7.88	27.18
1.15	25.57
3.68	25.85
3.57	26.65
3.92	28.88
1.19	26.58
4.03	28.15
4.05	26.12

Fat.	Caseine etc.
4.55	33.44
4.22	45.80

Fat.	Caseine etc.
4.43	36.97

tual nutritive power of the milk, which it increases greatly in two ways: 1st. It is itself a highly nitrogenized product. 2d. It is in these milks so balanced in connection with the butter as to be easily assimilated and digested without coagulation. These are valuable properties in their relation to the rearing of the young of the human or animal species, and I should expect to find these milks to possess fattening properties to an extraordinary degree, as indicated by the analysis.

CONSTITUENTS OF THE MILK OF DIFFERENT ANIMALS.

From a late examination of different kinds of milk with reference to their solid constituents, it has been ascertained that asses' milk is most diluted, containing scarcely 9 per cent of solid matter. Next comes human milk, with somewhat over 11 per cent, while mares' milk contains 17 per cent. The average is seen in the milk of the goat and of the cow. In reference to the percentage of caseine and albumen, human milk is the poorest, containing only 4 per cent of caseine; cows' milk nearly 5 per cent, with more than $\frac{1}{2}$ per cent of albumen. Again, goats' milk, with nearly 6 per cent of caseine and albumen, as far as known, has a larger amount of albumen than that of any other mammal. The smallest quantity of butter is found in asses' milk; that of the goat contains the largest, or nearly 7 per cent. Sheep milk is most nutritious, as it contains $11\frac{1}{2}$ per cent of proteine matters and hydrocarbons; and while the milk of the cow contains only about 4 per cent of milk sugar, that of the mare has 8 per cent, which renders it very prone to alcoholic fermentation, and has given rise to its employment by the Tartars in the production of an intoxicating liquor known as quass.

THE BEST RUNNING TIME AT VARIOUS DISTANCES.

Half a mile—Olitipa, by imported Leamington, Saratoga, July 25, 1874, 0.47 $\frac{3}{4}$.

Five-eighths of a mile—Bonnie Wood, by imported Bonnie Scotland, Saratoga, July 20, 1878, 1.02 $\frac{3}{4}$.

Three-quarters of a mile—First Chance, by Baywood, Philadelphia, Pa., October 17, 1876, 1.15.

One mile—Ten Broeck, by imported Phaeton, Louisville, Ky., May 24, 1877, 1.39 $\frac{3}{4}$.

Mile heats—Kadi, by Lexington, Hartford, Conn., September 2, 1875, fastest second heat and fastest two heats ever run, 1.42 $\frac{1}{2}$, 1.41 $\frac{1}{4}$.

One mile and one-eighth—Bob Woolley, by im-

ported Leamington, Lexington, Ky., September 6, 1875, 1.54.

One mile and a quarter—Charley Gorham, by Blarneystone, Lexington, May 18, 1877, 2.08 $\frac{1}{2}$.

One mile and three-eighths—Spendthrift, by imported Australian, Jerome Park, June 10, 1879, 2.25 $\frac{1}{4}$.

One and a half miles—Tom Bowling, by Lexington, May 12, 1874, 2.34 $\frac{3}{4}$. This horse was permitted to extend the run to two miles.

One mile and five eighths—Ten Broeck, by imported Phaeton, Lexington, Ky., September 9, 1875, 2.49 $\frac{1}{4}$.

One and three-quarter miles—One Dime, by Wanderer, Lexington, September 12, 1879, 3.05 $\frac{1}{4}$.

Two miles—Ten Broeck, by imported Phaeton, against time, Louisville, May 20, 1877, 3.27 $\frac{1}{2}$.

Two mile heats—Brandemante, by War Dance, Jackson, Miss., November 17, 1877, 3.32 $\frac{1}{4}$, 3.29. Doubtful.

Willie D, by Revolver, Prospect Park, September 11, 1879, 3.34 $\frac{1}{2}$, 3.35.

Two miles and one-eighth—Aristides, by imported Leamington, Lexington, Ky., May 10, 1876, 3.45 $\frac{3}{4}$.

Two miles and a quarter—Preakness, by Lexington, Springbok, by imported Australian, dead heat, 3.56 $\frac{1}{4}$.

Two and a half miles—Aristides, by imported Leamington, Lexington, Ky., May 13, 1876, 4.27 $\frac{1}{4}$.

Two miles and five-eighths—Ten Broeck, by imported Phaeton, Lexington, Ky., 1876, 4.58 $\frac{1}{4}$.

Two miles and three-quarters—Hubbard, by Planet, Saratoga, 1873, 4.58 $\frac{3}{4}$.

Three miles—Ten Broeck, by imported Phaeton, Louisville, Ky., September 23, 1876, 5.26 $\frac{1}{4}$.

Three mile heats—Brown Dick, by imported Margrave, New Orleans, April 10, 1865; the best second heat on record, and second best three-mile heat race, 5.30 $\frac{3}{4}$, 5.28.

Four miles—Ten Broeck, by imported Phaeton, vs. Fellowcraft's time, Louisville, Ky., September 7, 1876, 7.14 $\frac{3}{4}$.

Four mile heats—Lecompte, by Boston, at New Orleans, April 8, 1854, beating Lexington and Renbe, 7.26, 7.38 $\frac{1}{4}$.

Hurdle Races—Joe Rodes, by Virgil, mile heats, over four hurdles, St. Louis, June 4, 1878, 1.50 $\frac{3}{4}$, 1.50 $\frac{1}{4}$.

Appendix.

Tobacco and Its Cultivation.

CHAPTER I.

TOBACCO AS A MONEY CROP.

SECTION I.—WHY TOBACCO APPEARS IN A STOCK BOOK.

At the request of a considerable number of intending subscribers to this work, owning and keeping stock and therefore making large amounts of manure—necessary to the successful raising of tobacco, these chapters are added. This has been undertaken more especially, since some friends knowing me as a tobacco grower in years past, and at a time when the cultivation of cigar tobacco in the west was in its infancy, have also urged me to do it, the more especially since my duty has required me to keep myself fresh in much that relates not only to the growing, curing and packing, but also in regard to its growing commercial importance. One other reason has added weight to the request. The large amounts of manure made by stock growers will enable such to apply freely of manure, so essential to the integrity of the plants, the soil being of that nature as to adapt it to the production of a crop that when raised on proper soils and in proper situations pays largely, but on inferior soils runs the cultivator in debt. For that class who wish to undertake the cultivation, knowing little as to the special requirements necessary, this is intended, although it is hoped that the practical tobacco raiser will not leave the recital without receiving information.

SECTION II.—VALUE OF THE TOBACCO CROP.

Tobacco, either for chewing, smoking or in the form of snuff, is used in every civilized and semi-civilized portion of the globe where commerce and traffic extends, and is cultivated by barbarous tribes who have been able to obtain the seed.

The growth of tobacco increased enormously in the United States, from its first planting in the colony of Virginia. In 1617 the price in Virginia was from 37 to 75 cents per pound, of our money. In

1621 each colonist was required to raise 1,000 plants of eight leaves each, equal to 100 pounds of cured leaves. In 1622 the aggregate crop is given at 60,000 pounds. In 1639 the cultivation was so extensive as to so seriously lower the price as to carry it below the cost of production. Since that time the consumption and demand steadily kept pace with production, reaching 581,500,000 pounds in 1877.

Twenty years ago the annual production of the world was rated at 4,480,000,000 pounds, and 5,500,000 acres of soil were devoted to its cultivation. The production of tobacco has increased wonderfully in the United States within the last twenty-five years, and especially so in the west, and including the Pacific States. In 1880 the total area of tobacco cultivated in fifteen States and Territories, was 602,516 acres; the number of pounds was 446,269,889; and the value of the crop was \$36,414,615. The average prices of the tobacco grown in Connecticut and Massachusetts in 1880 was 15 cents per pound; in New York and Wisconsin the average was 12 cents; in West Virginia 11 cents; and in Pennsylvania 10 cents per pound. The average price of manufacturing tobacco—that used for chewing, for snuff and for smoking in pipes, ranges from 6 to 9 cents per pound; Tennessee and North Carolina raising the highest grade, Virginia and Missouri ranking next.

While we have thus tersely presented facts in relation to the importance of the tobacco crop, it must be recollected that the cost of producing and curing the crop is large, ranging in manure, cultivation, etc., from 50 to 100 dollars per acre, and if manure is not yearly applied to the land in large quantities, the value of the land will soon be destroyed and the produce run far below the cost of cultivation. In fact, the history of tobacco growing where manure has not been largely supplied, shows the wearing of

the soil and a constant change of tobacco-growing centers. On very rich soil to start with I was enabled to keep the annual production of Connecticut seed leaf between 1,500 and 2,000 pounds per acre of merchantable leaf, only by the application of forty large loads of horse manure per acre, for each crop taken off. If cattle manure is used, it must be supplemented with 200 pounds of guano or 400 pounds per acre of the droppings of fowls. This being the case, the cow manure is superior to horse manure.

CHAPTER II.

SITUATIONS AND SOILS AND GENERAL MANAGEMENT ADAPTED TO TOBACCO.

SECTION I.—THE TRUE TOBACCO BELT.

Tobacco requires a less amount of heat to ripen it for curing than Indian corn. A summer that will ripen the Concord grape will ripen tobacco. Its entire range is from the equator to 56 degrees north latitude, it being cultivated in this latitude in Russia. In the United States the latitude of 44 degrees may be taken as the limit of profitable culture for cigar tobacco. In the United States it is cultivated from Florida in the south, to Vermont and Wisconsin at the north, upon suitable soils and situations.

The true belt for the production of manufacturing tobacco—tobacco adapted to chewing and for smoking in pipes—lies in the States of North Carolina, Virginia, Maryland, West Virginia, southern Ohio, Kentucky, Tennessee, southern Indiana and southern Illinois, Missouri, Arkansas, and such portions of Kansas and the Indian Territory as receive enough rain to mature the crop.

SECTION II.—SITUATION ADAPTED TO TOBACCO.

The situations particularly adapted to the growth of tobacco are such sheltered valleys, or localities where the wind will not blow the leaves about thus abrading and breaking them, a locality at the same time free from late spring and early autumn frosts (in the north), and where the rainfall is sufficient from the middle of May until the middle of September to keep the plants growing fast. The situation must also be exempt from hail, for this is even more disastrous to a crop than sweeping winds, for wind may be guarded against by planting wind-breaks at proper intervals. The value of the crop is largely determined by the soil and situation, for no crop is so largely dependent for its quality upon soil and situation. One valley in Cuba furnishes the finest,

as well as the largest amount of first-class tobacco raised there. In Florida, one county, Gadsden, alone furnishes superior cigar tobacco, and this only in small quantities. Hartford, Connecticut, is the mart for over five-eighths of the 9,000,000 pounds grown in that State. In fact, but little tobacco is grown in New England outside the Connecticut River Valley. Three counties in Pennsylvania produce all the tobacco grown in that State, and a comparatively small area about Milton Junction produces a majority of the celebrated wrapping tobacco of that State. In fact, when it is recollected that but 602,516 acres are required to raise our immense crop, it will be seen that the whole area is but a speck in comparison to the whole area of the country.

SECTION III.—SOILS ADAPTED TO TOBACCO.

Any soil that will produce from forty to fifty bushels of corn per acre under good cultivation, may with manuring bring good tobacco. The soil, however, upon which the finest quality of cigar leaf is raised is a rich sandy loam, containing largely of potash, or soils formed by the decomposition of granitic formations; such are the best soils in Wisconsin and Connecticut, both noted for the superiority of the leaves produced. For this reason newly-cleared forest lands give heavy growths of tobacco, but often of rather "fat" leaf the first crop. Any soil required for the production of tobacco must be rich in humus and potash, for such soils produce nitre, necessary to the crop. Rich humus loams are usually rich in the constituents necessary to tobacco. If deficient in the nitrates and phosphates, they must be supplied either by guano and phosphate of lime or else by large applications of horse manure that has not lost its ammonia by heating. The best possible manure for tobacco is a compost of fresh horse manure and muck, with the droppings of the hen house, and the wash water of the house added. Such manure, if turned three times, will be quite free from the seeds of weeds. In the north, where cigar tobacco only is raised, the proper soil is a deep, rich, well-drained friable loam. If it be protected from hail and winds, the necessary nitrates and phosphates may be added if the soil should lack them.

SECTION III.—THE GENERAL PRINCIPLES IN TOBACCO GROWING.

There is a certain routine in the cultivation of any crop that must be attended to, to secure a profitable return, and these are constant and determinate in

every case. In all the region north of forty degrees, the seed is better sown in a gentle hot-bed, directions for making which will be given further on. South of forty degrees the seed may be sown in a sheltered dry soil, as early in the spring as the season will permit, and covered lightly with brush to protect it from chill and especially against the birds.

If on new soil, the bed should be prepared by burning brush upon it; if on old soil, by the admixture of well-prepared compost in addition. The seed-beds should be narrow, three and one-half feet wide, in order that they may be easily kept free from weeds. The soil is to be thoroughly pulverized. The seed should be mixed with dry plaster or ashes, and sowed broadcast. A tablespoonful of seed is sufficient for a square rod, and this will give plants enough for an acre and to spare. If the plants stand two inches apart a square yard will contain 9,800 plants; at three inches apart, 4,356. An acre planted three and one-half feet by three feet apart will contain 4,148 plants per acre.

The seed should not be covered, but the bed should be rolled or pressed with a board or with the hoe, and should be kept moist. The utmost care should be observed to prevent the growth of weeds among the young plants, whose growth must be urged forward as rapidly as possible. They should stand in the seed-bed from half an inch to an inch apart. At an inch apart the square rod will contain 39,204 plants. If they all stand, this will plant eight acres, but do not forget the rule, a square rod per acre including paths. Great care must be taken to guard the plants from the late frosts of spring. They are liable to be attacked, in an early stage of their growth, by a small black fly, which injures, if it does not destroy them. On this account, their growth should be stimulated by the application of ashes, soot, plaster, or guano, and they will soon get beyond its ravages. They should also be watered in dry weather from a common sprinkler. In about two months they will have attained a height of three inches, and be large enough to be transplanted.

An old tobacco-grower gives these general directions for the cultivation of tobacco, which are applicable anywhere.

A sandy loam is the best soil for growing tobacco. It should be thoroughly manured the fall previous by at least thirty loads of good stable or barnyard manure, and ploughed; should have a southern expos-

ure, and should be ploughed and harrowed, and thoroughly pulverized in the spring. About the 1st of June the plants should be set in rows three and a half feet apart, and in these rows three feet from each other. To facilitate the use of the horse-hoe or cultivator, the land should be marked crosswise, and the plants set in the intersection of the marks. Before setting, form a slight hill with the hoe, leaving a hollow on the top, and, unless the transplanting be done in wet weather, water should be put in each hill. Make a hole of a suitable depth, and having care fully placed the root of the plant in it, press the earth firmly around it. As some plants will fail to grow, care must be taken to have enough remaining in the seed-bed to supply failures.

In one week after transplanting pass through the rows with the cultivator and hoe the plants, and repeat the hoeing several times during the season. No weeds must be allowed on the field. The plants must be constantly watched, to protect them from the ravages of the tobacco worm. This worm, which preys upon the tobacco in the months of July and August is, in the south, the larva of the Sphinx Carolina. The moth is of a gray color, has on each side of the abdomen five orange-colored spots encircled with black, and has a tongue that can be unrolled to the length of five or six inches. The larva is a long, green worm of a disgusting appearance, having a caudal horn, and is generally known as the tobacco worm, though it is sometimes called the horn worm. North of 40 degrees is an allied species but smaller. The utmost vigilance is necessary to prevent these worms from injuring the plants. They must be examined morning and evening, and the worms and the eggs deposited by the moth must be picked off and destroyed. The eggs will be found on the under side of the leaf. Turkeys will devour the worms greedily, and kill them even after their appetite is satiated. The chief reliance must be upon seizing them with the thumb and finger and destroying them.

In order to throw the energies of the plant into a few large leaves, it is necessary to cut off the top at



The Plant and Root growing. The line shows where the root may be pinched off.

but a few of the top leaves which cannot be fully developed. The number of leaves to be cut off with the top depends upon the forwardness and strength of the plant, some requiring the removal of more and some less. The suckers at the foot of each leaf stalk must be carefully removed in the incipient stages of their growth, by pinching them out.

HARVESTING AND CURING.

Much discernment and good judgment are necessary to determine when the crop is sufficiently mature for harvesting. When ripe it turns spotted, and the color of the lower leaves changes to a brown. It is essential that the plants be housed before the first frost. The whole crop will not be ripe at the same time, and it will be necessary to pass through the time of flowering—cutting off not only the flower,

sible, and still permit a free circulation of air. If hung too closely, they are injured while in a green state. By some planters the drying is hastened by a gentle fire underneath, but generally reliance is placed on the air, which is freely admitted in dry weather, but is excluded in damp.

Many planters think it best to commence the harvest when the majority of the plants are ripe, and then take them clean in cutting. They think the scattering plants are more liable to injury from wind and rain. Good planters, doubtless, differ on many points in the culture of tobacco; and those who engage in the business must profit from their own observation and experience.

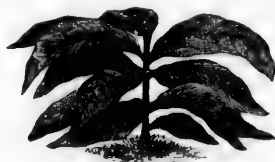
THE TOBACCO HOUSE.

The size of the tobacco shed should vary with the



A Tobacco House.

field, selecting such plants only as appear to be ripe. They are cut with a knife similar to that used for cutting cornstalks, and are laid upon the ground for a few hours to wilt, but must not be long exposed to a hot sun. They are then removed to the tobacco



The Plant Suckered ripe for cutting.

house, and hung up by pegs driven into the stalk, by a mallet, about four inches from the largest end of the stalk, or by tying the stalk to poles which are laid on beams or joists as near to each other as pos-

sible, and still permit a free circulation of air. If hung too closely, they are injured while in a green state. By some planters the drying is hastened by a gentle fire underneath, but generally reliance is placed on the air, which is freely admitted in dry weather, but is excluded in damp. Many planters think it best to commence the harvest when the majority of the plants are ripe, and then take them clean in cutting. They think the scattering plants are more liable to injury from wind and rain. Good planters, doubtless, differ on many points in the culture of tobacco; and those who engage in the business must profit from their own observation and experience.

The size of the tobacco shed should vary with the extent of the crop which it is proposed to cultivate. Its height may be such as to receive several tiers of plants when suspended on the poles. These poles should be placed five feet apart. A free ventilation should be secured from the sides of the building by having the boards placed vertically, and every third board hung on hinges. The building should also admit air from beneath. It should have a tight roof, on which there should be a ventilator constructed with slats in the form of Venetian blinds. The main principle to be secured is a free and perfect ventilation, which will carry off the moisture of the plants as fast as possible. During the prevalence of cold, drying winds, the ventilators on the windward side should be closed, and in very damp weather they should all be closed. A building thirty-five feet long, twenty-four feet wide, and fifteen feet high, will receive three tiers of plants, and will store the tobacco grown on an acre. The illustration shows a complete tobacco house of five tiers of

tobacco, with shutters that may be opened or closed at pleasure.

STRIPPING.

When the plant is fully cured, which may be known by the stem of the leaf becoming free from sap, it is to be stripped from the stalks. A damp day should be selected, so that the leaves may not crack and waste. It is essential that they be pliant. As it is stripped from the stalk it is assorted into different qualities, according to the uses to which it is to be applied in manufacturing. The broad leaf, which is suited to form wrappers for cigars, must be carefully laid by itself. A sufficient number of leaves is tied together to form what is termed a hand, and the leaves are bent over, forming a head, around which a wrapper is wound and tied. These are laid in piles, the bent ends outward, and, after remaining for a few days, they will be ready to pack. In the south, tobacco is packed in hogsheads; in the north in boxes called cases. Heavy pressure is used by which the tobacco is pressed into a hard mass, so that a hogshead contains from 750 to 900 pounds. In the north cigar tobacco is more lightly pressed. In this condition it is sent to market.

A SUMMARY.

The following, applicable everywhere, are points on which experienced growers strongly insist, because they express conditions of success in cultivating tobacco:

1. The land must be in good condition—well enriched with manure. It must be ploughed in the fall, and again in the spring, and be thoroughly pulverized.
2. The plants in the seed-bed must be carefully weeded and guarded against the fly, and so thinned out as to require a hardy growth before being transplanted.
3. During the season for the ravages of the worm the plants must be examined twice each day for the purpose of destroying them.
4. In curing, the leaf-stalk must become perfectly freed from moisture.
5. Those who are commencing the culture of tobacco should avail themselves of the services of an experienced man who can supply that knowledge which must come either by special instruction, or costly experiment.

It may be proper to say a word in regard to the profit of the crop. In the first place, if the crop is

grown on one field but for a single season, it leaves the land in good condition for any crop the next year. It is highly manured and free from weeds.

It may be followed by wheat, and then by grass, and by this rotation remunerative crops may be secured without exhausting the soil. The worn-out fields in some of the tobacco-growing States should be monitory to cultivators, and teach them one of the most important lessons of modern tillage, viz: the necessity of a proper rotation of crops.

SECTION IV.—COST OF PRODUCTION.

The cost of the production of a crop, and the price received determines the profit and loss. The richness of the soil determines the quantity, and the price the quality. To show cost as between a soil heavily manured and a virgin soil, I present two statements. The first, that of a careful cultivator in Massachusetts, the other, a first-class grower in Wisconsin.

EXPENSE, MASSACHUSETTS STATEMENT, TWELVE ACRES OF LAND.

Interest on land, at \$100 an acre.....	\$ 72 00
180 loads of manure, at \$1.50.....	270 00
8,000 pounds of guano, at 3 cents.....	252 00
2,000 pounds of superphosphate, at 2½ cents.....	60 00
Entire labor, on twelve acres, of preparing land, setting, cultivating, and harvesting.....	660 00
	1,314 00

RETURNS.

20,250 pounds prime leaf, at 12½ cents.....	\$2,531 25
3,600 pounds "fillers," at 4 cents.....	144 00
	2,675 25
Cost.....	1,314 00
Net profit.....	1,361 25

The next season the field was sown to wheat and yielded a net profit in grain and straw of \$948.40.

EXPENSE, WISCONSIN STATEMENT, TEN ACRES OF TOBACCO.

Rent of land, at \$10 per acre.....	\$100 00
Ploughing and preparing land.....	28 50
Making and sowing plant beds.....	3 55
Fencing beds.....	1 50
Weeding beds.....	12 00
Watering beds.....	5 00
Setting plants on ten acres.....	27 50
Cultivating and first hoeing.....	14 00
Cultivating and second hoeing.....	17 25
Three days' worming.....	3 75
Seven days' topping.....	8 75
Thirty days' suckering.....	37 50
Seventy-two days' harvesting.....	90 00
Team-work, harvesting.....	10 00
Stripping and casing.....	75 00
Interest on cost of shed and fixtures.....	35 00
	\$ 469 25

RETURNS.	
Plants sold.....	\$ 26 00
Seeds sold and for sale.....	25 00
Eight and one-half tons of tobacco, at 10 cents per pound.....	1,500 00
	\$1,651 00
Cost.....	469 25
Net profit.....	\$1,181 75

These statements carry with them all the cost of labor and other expenditures for making the crop in the best possible manner, and may be taken as correct as to the time and labor actually spent. Nevertheless, we should not advise any person to undertake the permanent cultivation of tobacco unless there could be plenty of manure gathered together to give forty large loads per acre. Then, wheat may follow tobacco, and meadow and pasture for three years, then Indian corn the next year, to be followed again with tobacco and manure. Thus a heavy burthen of tobacco may be raised every year, the same land only coming into a similar crop once in six years.

SECTION V.—THE QUESTION OF MANURE.

The question of manure is one of the most serious ones in the whole category embraced in the cultivation of tobacco. Without manure, only the most careful and lengthened rotation will keep the land in sufficient heart to produce remunerative crops. The only difference in the cultivation of an acre producing 1,000 pounds per acre and 2,000 pounds per acre, is simply handling the extra 1,000 pounds in harvesting. The papery light small leaf will not bring the price that the other will. There will always be more filler tobacco to be sold at four or five cents per pound, so that again it will be seen that he who manures to bring the crop from 1,000 to 2,000 pounds, can really afford to spend the price of 1,000 pounds of tobacco in manure. Horse manure stands first for tobacco, next that of sheep, hogs comes next, and the manure of cattle comes last. Sheep manure is nearly as good as horse manure. Of hog manure one-half more is required, and double the quantity of cattle manure is necessary, than of horse manure, to give a relative amount of nitre.

HOW TO MAKE COMPOST.

Leached manure, that is, manure that has laid exposed to the weather, its ammonia carried off by heating, and its other valuable parts leached away by the rains, is of very little more value than so much straw. Even compost, which is readily soluble in

water, cannot act until saturated with rain. My experiments have shown that any crop may be forwarded immensely by the use of liquid manure over the best compost, and as between compost and ordinary manure there is the same relative difference. Hence, the value of liquid manure in the watering of the plants in the beds. It must be applied in a very dilute state. To make compost, prepare a place dishing in the middle on an impervious soil, the center being a hoghead sunk to receive all the drainage; cover the hoghead loosely with boards and insert a common pump, extending to a height sufficient to be above the top of the compost heap. Cover the bottom of the heap to the depth of say twelve inches with manure just as it comes from the stable, then cover with six inches of muck, soda or loam; so continue until the heap is carried up eight feet or as high as it may be convenient. The water that leaches into the hoghead or the depression at the middle may be pumped over the heap to keep it just moist, and until saturated, water may be thrown on as the heap is being formed. In making the heap, all the refuse of the farm, house wash, weeds, chip manure, and anything of a like nature may be used, and if the drainage of the stables can be carried to the pile so much the better. If wood ashes and bones are available, break the bones as small as may be by pounding with an iron maul in a bowl-shaped cavity made in a stump, pack these in a leach, two or three bushels of ashes to one of bones, saturate with water until it begins to run at the bottom and then keep it just moist by pouring back the liquor from time to time. In six months the phosphate of the bones will have been rendered soluble and the whole may form a part of the compost, or be kept for special application. For using on beds of plants, etc., set up a leach, into which hen manure, urine from the house, solid horse droppings and ashes have been mixed. One quart of the strong liquid from this, may be mixed with each pail of water used in watering the beds of plants.

The compost heap in the late summer may have added to it the contents of all the leaches, and be broken up and turned over twice at intervals of a month, when it will be found reduced to the nicest compost and available as a top dressing in the spring, the coarse manure from the stables having been plowed under pretty deeply the previous autumn.

CHAPTER III.

RAISING PLANTS AND SETTING THE CROP.

SECTION I.—VARIOUS MEANS OF RAISING PLANTS.

The means of raising plants are various and diverse. Whatever the means, there should be no slipshod nor haphazard management. There are enemies enough to the young plants to require not only the best possible care but also that a large surplus of plants be raised to provide against loss, and any contingency that may happen. If by any means you happen to lose your seedling-beds, you must either buy your plants or lose the season's crop, neither of them pleasant contingencies to be encountered. If you have a surplus of good plants you will seldom fail to find customers for them. I have sent plants hundreds of miles, season after season, by express, properly packed. If you lose your seedlings, we should hardly advise buying the plants from long distances, unless you know exactly the men you are dealing with, and that the seed is pure and of the definite variety you wish. For this reason, always raise your own seed, from plants of a pure variety, except that it is well to change the seed once in three or four years. When you do change, know of whom you buy your seed, that it is pure, and in the selection of plants for seed use none but those having all the characteristics of purity of the variety cultivated. Experiment as much as you please, *in a small way*, with new varieties; never for the crop, unless you have satisfied, first yourself, and second, the buyer—and this is the most important—that it is valuable. You must satisfy yourself that it will be more profitable than the old variety, and the buyer that it will outsell it to the manufacturer. Connecticut seed leaf, and Havana seed are the only varieties that have yet given satisfaction in the north, for cigar tobacco. In the south varieties have a wider range, and localities have in many cases one or more varieties grown exclusively in a district. The same rule, however, will apply south. Never change one variety for another, until the most careful experiments, both in the field and the manufactory, have decided its superiority.

SECTION II.—THE SEED BED.

My own experience warrants me in saying that depredations from insects, risk from frosts and chilling winds, and the various contingencies that out-

door cultivation of the seed bed is liable to, makes a gentle hot-bed or a cold frame the most economical, and especially for the reason that, under glass, every plant will be alike, or at least there will be but two grades of plants, firsts and seconds. The check in the growth of plants upon transplanting is almost nothing, for the reason that they are furnished with an abundance of fibrous roots, and during the whole season of growth this abundance of feeding roots is fully kept up. This is of the



Tobacco Plant for seed. *a*, the place for topping for leaf.

greatest moment in the north where high priced cigar wrappers are grown, and will often enable the grower to fully ripen the crop, when otherwise the crop would be so retarded that the cutting and curing must take place in weather too cool for the perfect ripening and curing of the crop. In Missouri, Kentucky, Tennessee, Virginia and south, this necessity is not so strong, nevertheless, in these States cold frames are cheaper in the end than open air beds.

SECTION III.—HOT-BED SEEDLINGS.

First, let us see what is the required dimensions for a frame to contain plants enough for an acre; then any man can figure for himself the required space necessary for plants for his crop, allowing not less than twenty-five per cent extra for contingencies. The sash should be six feet long, and each should contain four rows of 8x10 glass. This, with the side pieces two and one-half inches wide will make each sash about thirty-eight inches wide. The bed may contain healthy plants to within six inches of the lower side. Hence, we have a space sixty-six

inches by thirty-seven inches, equal to 2,442 square inches. The plants may stand in this space 2x2 inches; consequently, each compartment will contain fully 600 plants. Seven sash will contain plants enough for 4,500 plants. At 8x3 feet an acre will contain 4,840 plants; at 42x30 inches 4,978. Hence, eight sash will produce plants ample for an acre even with the closest planting, and to spare. Heating manure is not needed except for the crop of minute seedlings to be pricked out into the cold frames, ready for transplanting into the open air. Sixteen sash will contain all the minute plants for pricking into cold frames, to plant ten or twelve acres, and the whole number of sash required for ten acres would be eighty, and your crop would be two weeks ahead of those grown in the open air, and every way stronger and better, because better furnished with roots.

SECTION IV.—HOW TO MAKE A HOT-BED.

Any farmer who understands the use of the square and saw and can drive nails can make a hot-bed frame. The frames should be made of one-and-a-half inch stuff, pine or hemlock, for the back and front, and one-inch stuff for the sides, one foot high at the front, and sixteen inches at the back, the sides beveled to correspond, the posts of two by four scantling, of the same length as the back and front. For each four sash, it will require six posts, one at each corner, and one at the middle, front and back. Nail all together, the posts inside, so that it will be tight. Let in strips across the frame at suitable intervals, for the sash to rest upon. These are made of strips, one-and-a-half inches wide by three inches deep, worked so that there may be a projection one-half an inch wide for the sash to slide on, leaving one-half inch wide between the sash. The place in which the sash slides should be just flush with the top of the frame, and should be secured to the frame, to keep it from spreading.

The sash should be made of best two-inch clear stuff, with strips for four rows of glass, and without cross bars—hence the necessity of having them strong. If the spaces are suitable for 8x10 glass, they will also accommodate 8x6, which is a preferable size, since, if one is broken, it is more cheaply replaced. The sash will be about three feet four inches wide, if the sides and ends are made three inches wide. The lower end should be made thinner than the other, so that the water may pass freely

off from the glass. The glass should be lapped in the spaces, tinned, and cemented with the best putty.

Great care should be taken that the frames are nailed securely to the posts, and the partitions between the sash arranged so that they may slide easily, and yet be sufficiently tight to retain heat and moisture. Nail a half-inch strip upon the inside of each end of the frame, for the sash resting there to slide upon. The frame is then complete, and will be found to be the cheapest *good* frame that can be got, and the sash is the best that can be made.

If the sashes are made six feet long, in this case the ribs must be stiffened through the middle. If the soil is dry where the bed is to be made, I would advise digging a pit for the manure, six inches wider and longer than the frame, and sixteen inches deep, the soil thrown out to be used for banking the sides and ends, but if not the bed may be made on the surface. For tobacco, the middle of March to April first, will be time sufficient.

A week or ten days before you are ready to make your bed, fresh horse manure, long and short, should be hauled near the bed and thrown into a compact conical heap, or, if a range of beds is intended, into a ridge. As soon as it begins to heat thoroughly it must be turned over, mixing the long and short together, shaking out hard lumps, and if too dry, such portions should be watered so that the whole will be uniformly moist; since upon this condition depends the success of the endeavor. After three or four days it should be turned again, when if in a proper state it will have assumed a uniform brown color throughout the mass.

Avoid allowing it to *fire fang*, or assume white streaks through it. When sufficiently fermented so that it has lost its fierce heat, it may be placed in the bed by scattering it evenly thereon, shaking out all lumps, using a due proportion of long and short manure, and having it uniformly moist—not wet—patting it down from time to time to avoid holes and soft places. It should be as well and carefully made as a good stack, since if it settles unevenly, no after manipulation can wholly remedy the defect. Always choose a still day.

Fourteen or fifteen inches in thickness of well-tempered heating manure will be sufficient for tobacco. When the whole is finished, the manure and earth well settled, the top of the earth should be

about six inches from the glass to prevent the plants spindling up.

The frames may now be placed on the bed, which should be banked up, the glass laid on, and the bed be left to sweat. So soon as the heat begins to rise, two inches of good earth should be evenly spread over the bed, and when a thermometer placed within, remains stationary at about eighty degrees or ninety degrees, five inches more of the best composted earth may be added. If your heat is too strong and rank, the first earth put in will have assumed a gray color. This is to be avoided, and only the best and most friable soil should be used.

A good compost for hot-beds is one-quarter sharp sand, one-quarter thoroughly decomposed manure, one-quarter good soil and one-quarter rotten leaf-mold, thoroughly mixed by turning together. Whenever the hot-bed is placed the greatest care should be taken to prevent the intrusion of dogs, as they are very fond of lying on the mats, with which the glass is usually covered at night, occasioning a work of destruction that is often very damaging.

A cold frame is simply beds with frames around and covered with glass, containing no heating manure, but five inches of the best composted soil. This compost soil must be carefully saved in a compact heap to be used year after year, adding to as may be necessary.

When the hot-bed marks an even temperature of about seventy degrees, when covered from the sun, sow the seed, evenly, at the rate of a teaspoonful to each sash; simply press the earth firmly about it, but do not rake the surface; but a slight sprinkling of wood ashes over the surface will be good. Sprinkle with the finest rose watering pot to settle all firmly and do not let the heat rise above seventy degrees. As soon as the seed germinates admit air cautiously, but freely. Then endeavor to keep the heat below seventy degrees during the day, and by covering with mats or slough hay at night, not much below fifty degrees. The ranges of hot-beds and cold frames must be in a situation fully protected from wind, and the ventilation should be by tilting the sash so the wind will not blow directly in; that is, the glass must be inclined by blocks towards the direction from whence the wind is blowing.

As soon as the plants are up to show fully green, with a thin case-knife, the end turned up a quarter of an inch, cut streaks half an inch or less wide every

two inches through the bed when the plants stand thick, and when the plants seem to need it do the same the other way of the bed. This is done by removing the sash on some still, pleasant day, and placing a board over the middle of the bed. The same plan is to be used in weeding the bed.

When the plants are an inch high they are ready for pricking out into the cold frames where they may remain from four to six weeks, according to the season, the last ten days or two weeks fully exposed to the air except at night and during storms. No water must fall on the beds except that given with a watering pot, and the temperature of the water should not be below fifty degrees; that is, it should have the chill off, and the growth of the plants must not be forced. The slower the growth, if steady, the better the plants.

SECTION V.—THE COLD FRAMES.

When the plants begin to grow, or about ten days before they are to be pricked out (transplanted) to the cold frames, have these ready by carefully smoothing and leveling a proper space in some sheltered, well-drained spot; place the frames in ranges of not less than eight sashes to each frame, throw in roughly six inches of the prepared compost, place on the sash, keep the earth moist and as soon as the weeds start rake all smooth; let the weeds start again, destroy them and the bed is ready for planting.

SECTION VI.—PRICKING OUT.

Rake the earth in the cold frame level, smooth and perfectly fine, make it rather firm with the back of a shovel or hoe, and again rake a slight tilth on top. The earth must be simply moist—never wet. Prepare a board six feet long and twelve inches wide to stand on, also a marker by inserting in a rod, three feet six inches long, slender pegs an inch long and exactly two inches apart; with this, mark a row, beginning four inches from the back. Another hand does the same in the next compartment, and thus the board upon which you mark is kept from tilting. Sharpen a piece of clear, sound pine, eight inches long and three-quarters of an inch thick, to a true taper for the last four inches of its length. Take up the plants from the seed beds in clumps, leaving alternate clumps to grow and spread. Place them in a pan. With the right hand make the hole with the spud, take a plant lightly by its tip, drop the root in the hole, push the spud in the earth behind it and somewhat diagonally, and press the earth up to it pretty firm, holding the

plant so it will stand with its leaves just above the ground surface. If the plants are somewhat spindling, place them so the leaves will be as heretofore directed. So proceed, marking each succeeding row regularly two inches apart, and planting, drawing the board back as you proceed, and planting the last rows from the outside of the bed, and sprinkling from time to time with tepid water from a very fine rose water pot. If the plants wilt, cover from the sun as you go, and in no case transplant when the weather is windy or chilly. The operation is soon learned to be deftly performed and a good hand will prick out ten thousand plants in a day. Keep the bed sufficiently shaded for a day or two to keep the plants from wilting, give water sufficient to penetrate to the roots after they are set, and brush the tops over lightly once or twice a day, only just to moisten. When they begin to grow give air rather freely in warm weather, but endeavor to keep the heat between sixty and seventy degrees during the day, and cover at evening so as to hold a heat of not less than forty-five degrees; fifty degrees is better through the night. So proceed until you have the requisite number of plants for your field, whatever it may be.

SECTION VII.—WATERING.

Water only when the plants need it; when first planted every day, later every two days. It is better when the plants get fairly to growing not to water until the earth becomes rather dry, and then water thoroughly. This gives the roots the vapor of water, just what they require, and keeps the earth evenly moist. Water always with tepid water, say at fifty or sixty degrees, and preferably in the afternoon about half an hour or more before closing the bed for the night.

SECTION VIII.—VENTILATION.

Give plenty of air. Plants cannot grow healthy without it. When the weather is still and warm remove the glass entirely for some portion of the day. Keep the glass closed only in cold, lowery, or very windy weather. Buy a good thermometer and use this until you become acquainted with the proper temperature. Towards evening close all up, in time so the sun will raise the heat to seventy or eighty degrees. At nightfall cover with slough hay or mats, to conserve heat. If there is a good gardener near you, take his advice in connection with the directions here given, and bargain with him to instruct

you in putting up the bed, and in pricking out the plants.

SECTION IX.—WEEDING THE PLANTS.

All weeding must be done in the original seed bed by hand. Place a board along the top of the frame, lie down on it and weed. This is the easiest way, and the least tiresome of any. A case-knife slightly turned up square at the end will be the best implement for keeping the rows of plants pricked out clean and cultivated. It is used lying down the same as directed in weeding. If you have prepared the compost a year ahead as directed, weeds will trouble you but little. Nevertheless, the earth should be slightly stirred between the rows from time to time, say every four or five days; cut-worms must be watched for and killed; the fly and other insects which eat the leaves may be driven off by fumigating with tobacco smoke, or by dusting with pyrethrum (insect) powder from time to time. If you have carefully followed these directions you will have plants for setting that will be the envy of your less considerate neighbors, and when transplanted to the open air will make your field green before your neighbors' fields show signs of growing.

SECTION X.—TRANSPLANTING IN THE FIELD.

Here again, system will save money and time. The field having been prepared and properly marked, have a lot of light boxes made eighteen inches wide, thirty inches long and with sides four inches high. With a knife or proper spud raise the plants from the bed allowing them to retain what earth will naturally cling to them; place a row closely along one end of the box, then successively other rows slightly leaning against them and as compactly together as may be. The bed should have been thoroughly watered the afternoon before lifting, never just before lifting—the tops should be dry.

When you have enough of the boxes ready to serve the hands in the field, pack in a spring wagon, or, if near, carry what two men can manage on a hand barrow and so proceed lifting and setting.

HOW TO SET THE PLANTS.

A division of labor will serve here. One hand lays a plant at each mark, two rows at a time, or, if the boxes have handles, one man may do both, planting two rows as he goes. With the fingers of the left hand make the place to receive the plant, drop the plant in with the right, and with the fingers of both hands firm the earth to the roots, leaving a

slight depression on each side. A hand follows with a water can and drops a little water from the spout so it will settle about the roots. Another hand follows after the water has settled entirely away and draws the dry earth over all, and so it will just reach the lower leaves. A little experience and instruction will enable the hands to do all this deftly and far quicker than it can be told. We have never waited for rain in any kind of transplanting, and have in this way never lost our transplants—except by frost, cut-worms, etc. Do not set your crop until the days and nights are warm, and do not wait for rain. Plant when the soil is in such condition that it will work nicely but not when it is *wet*. The time for transplanting is after all danger of frost is over, or at such time as corn will germinate promptly and grow right along.

SECTION XI.—CUT-WORMS.

The black cut-worm is often destructive to the crop. They must be gathered by hand very soon after daylight and killed and the plants renewed from reserve plants. It is sometimes tedious, but it pays. Thus I have given you my experience both as a tobacco raiser and a general market gardener, that which I have been years in learning.

SECTION XII.—OUT-DOOR SEED BEDS.

All that is necessary to say in this connection, in addition to that already given, may be embraced in the following general rules:

1. Select a well-drained, light, rich, friable, level soil.
2. Raise it into beds of finely-pulverized soil of any length, but not more than four and a half feet inside, for convenience in weeding. The alleys two feet wide, the top two inches to be thrown on the bed, and the whole thoroughly incorporated together.
3. Let the alleys be perfectly hard and smooth on the bottom, the beds to slope down to them at an angle not greater than forty degrees.
4. Give the beds a top dressing of an inch of the best compost manure and rake all to a perfect tilth, drawing all lumps, sticks, stones, etc., into the alleys.
5. If the whole surface of the beds have been covered with brush and burned over, before they are formed, especially if the soil is new, the compost will not be needed.
6. Each bed, four and one-half feet wide and 160 feet long, should contain plants enough for one to

two acres of tobacco, after the plants have been properly thinned. To provide against every contingency, it is safe to make one such bed for each acre of tobacco.

7. Sow each bed at the rate of one tablespoonful of seed mixed with clean ashes, or plaster, to ensure even sowing. Press the soil firmly to the seed with the back of a spade and sow over all the lightest possible dressing of compost.

8. Cover with brush to keep off vermin, and to hold warmth. Let the brush lie on the beds until the plants require weeding.

9. Fence the beds to keep out dogs and other animals.

10. Water the beds as may seem necessary; keep clear of weeds and thin out as may be necessary, so the plants will stand at least an inch apart.

CHAPTER IV.

THE MANAGEMENT OF TOBACCO.

SECTION I.—CULTIVATION AND CURING SOUTH.

One of the best Kentucky growers of tobacco gives his manner of cultivating and curing, which we make known as covering all the essential points in the cultivating and cure of manufacturing tobacco, or that raised in the south.

After transplanting, no further attention is required till the weeds and grass make their appearance; these should be at once subdued with the plow and hoe. If the earth becomes dry and hard about the plant, it should be lightly scraped with a hoe, which will greatly facilitate growth. As soon as the plants are of size to permit it without injury, the ground should be deeply and thoroughly plowed, care being taken not to disturb the roots, and the plant hilled up by following with a hoe. In land that has been kept clean this may be the last plowing, the hoe being all that is needed to keep down the few weeds that may appear. When the plants are large enough to top, the leaves nearest the ground are to be broken off and the bud taken out, leaving on the stalk the number of leaves designed for the crop. This number is much a matter of fancy, yet it has more to do in forming the character of the future tobacco than most planters seem aware of. Experience has fully proved that ten or twelve leaves are sufficient for a plant, and this is almost the universal number among our best planters. If the crop

has grown well, twelve leaves may be allowed at first; the next topping it may be ten, and the number thus lessened as the season advances, or as the appearance of the crop may indicate. This saves much labor, insures more uniformity in maturing, and adds to the value of the crop, making it more uniform in quality.

At this stage the attention of the planter is almost constantly required in protecting the crop from the



Cut showing Plant with one Sucker left unpinched.

worms and insects that prey upon it, and in breaking off the suckers which soon appear at every leaf along the stalk. This will give ample employment to all idlers about the premises.

As the plant approaches maturity it begins to thicken, and assumes a stiff, sleek, and motley appearance, which the most unpracticed eye will readily observe. Should the weather be dry and favorable, the first ripe plants may remain standing till a sufficient quantity matures to make a regular cutting; but if the weather is unpropitious it is best to cut as fast as matured, as it is liable to injury if allowed to remain too long.

The harvest time of the crop is an important period, as any neglect then on the part of the planter will result in depreciation of its future value. In cutting the plant a sharp knife is to be used, and the stalk to be split about half its length, taking care not to break the leaves or otherwise injure them. The plant is then to be set with the butt of the stalk up, exposed to the sun. When it is wilted enough to handle without breaking, it should be taken up and laid in heaps of from seven to nine in a place, and then hung as soon as possible to prevent its being scorched by the sun. The latter part of the day is best for cutting; there is less danger of the plant getting sunburnt.

The sticks on which the plants are hung are small pieces of timber about four feet long, and of suffi-

cient strength to support them. These, when filled, may be taken to the barn on a cart or wagon, or may be placed on a scaffold in the field. If the weather is fair it is best to sun the crop, as it aids the curing and adds to the strength and elasticity of the leaf after it is cured. Care should be taken not to place the sticks too near each other if the weather is damp and warm, as there is danger of injury. After remaining on the scaffold a few days it assumes the color of a leaf in autumn; it must then be taken to the barn or curing house and placed away, keeping the sticks far enough apart to secure a free circulation of air through them. If the weather is wet, it is best to take the plants to the house at once and let the following process take place there rather than risk it in the field, as rain is always injurious to tobacco after it is cut, and especially so after it becomes yellow.

The curing process is of the utmost importance to the future value of the crop, and too much care cannot be given to it. If the weather is dry, and the tobacco is not too much crowded in the house, the action of the atmosphere should be assisted by furnaces instead of fires. Smoke from fire is very injurious to fine manufacturing and cutting tobacco; all lovers of the weed greatly prefer its natural flavor. Many accidents happen yearly from the use of fire. The difference in the sale of one good, ripe, furnace-cured crop will pay for all the outlay for furnaces and fixtures for twenty years. The heating is more uniform, and less fuel is used. Where furnaces are not to be had, a small fire will effect the object. If the weather is warm and damp the atmosphere will not aid materially in curing the plant, and unless firing is resorted to it is certain to be more or less injured. It is always safer after a house is filled with green tobacco to rely mostly on the action of fires for curing. These should be small and slow at first, and continued so until the moisture engendered by the fire is dried out, and then increased till the leaf is nearly cured. Then the fires should be allowed to go out, and the tobacco to come in case, or get soft again. The quality will be much improved by permitting it to come in case once or twice before it is thoroughly cured in leaf and stalk. Dry sound wood is best for the fires.

If the planter desires to make a piebald or fancy article, care should be taken never to permit the leaf to get very soft during the curing process. To make

a really fancy article, the tobacco must be thoroughly yellowed first, and then be cured entirely by fire. This particular description, however, is not more desirable or valuable to consumers, as the essential properties of the plant are frequently destroyed by the action of the fire. As a general thing, it is better to cure the weed by the natural process of the action of the atmosphere, and where the planter has room enough to house the crop without crowding too close, the object can be attained without much fire, saving wood and avoiding much danger.

Having now reached the point when it is supposed the crop is secured and cured, we proceed to give some directions in regard to its future management and preparation for market, as many, after all their care and labor, lose their profits to a great extent by want of knowledge in this respect, or by inexcusable carelessness.

When the tobacco is thoroughly cured it is ready for the process of stripping, or taking the leaves from the stalk. The plant first passes through the hands of the most experienced laborer on the farm, who takes off the bad or injured leaves and ties them neatly in bundles of eight or ten. The plants thus culled are given to others, who strip off the remaining leaves and tie them in bands of six or eight, wrapping tightly with the tip of the leaf, used as a tie, so as to form a head of one and a half inch in length. These bundles should be as uniform as possible in size and color, as it adds to the beauty of the sample by which it is to be sold.

When the day's work is done, let the bundles, neatly pressed through the hands, be put in a winrow—that is, laid straight in a bulk or pile long enough to hold the work of one or two days, and only the width of one bundle and a half, reversing each course so as to have the heads of the bundles out. Here it may remain till stripping season is over.

Cold, winds, and frosty weather injure the texture and rich flavor of the leaf. The first good drying weather after the stripping get the smoothest and smallest sticks upon which the tobacco was hung, and hang it up again to dry. When the weather becomes moist enough to bring it in case, take it down and carefully bulk away as before directed, only taking more pains to straighten the bundles and make the bulk much wider; this is done by lapping the bundles over each other like shingling a roof, the bulker having his knee upon the bulk, carefully lay-

ing down the tobacco as it is straightened and handed to him. When the bulk is finished, weigh it down heavily with logs or some heavy weight.

Care must be taken that the tobacco does not imbibe too much moisture, or get too high in case before it is bulked, as it would injure. Whenever it is soft enough to handle without breaking it may be put in bulk; and should the stems break a little under the pressure of the bulker's knee no material damage will be done, provided the leaves do not crumble. A little attention will soon teach the most ignorant the proper order for safe keeping. The tobacco will be safe in bulk, and will wait the planter's convenience to prize it in hogsheads.

In prizing, the different qualities should not be mixed, and if proper care has been taken to keep them separated, no trouble will be had in assorting them. In packing, every bundle should be kept straight, and every leaf to its bundle. From a well-packed hogshead any bundle may be drawn without injury or disturbance to others. The usual way of packing is to commence across the middle of the hogshead, placing the heads of the first course about eight or ten inches from the outer edge, and running the course evenly across; the bundles of the next course are placed in the same direction, the heads against the side of the hogshead, and follow the circumference till the heads of the two courses come in contact. After that course is completed, the other side is finished by placing the heads against the cask as before, so as to have three courses across the cask, the bundles all laid in the same direction. The next layer is reversed, the packer carefully laying each bundle as it is handed to him. When filled, it is subjected to the press or screw and pressed down.

The hogsheads are from forty-four to forty-eight inches across the head, and fifty-eight inches deep. From 1,800 to 2,000 pounds can easily be prized in them. If the tobacco is large, rich and oily, the harder it is pressed the better, and the better price it commands. These remarks are especially applicable to those heavy kinds of tobacco grown where the soil and climate are peculiarly adapted to its production. In climates and soils not so well adapted to it, the same variety will assume a different character, the texture of the leaf being changed, being more light and bulky, and destitute of oil and substance. Tobacco of this description should be managed as above directed, but prized lightly in the casks, so as

to admit of a free and open leaf, such being mostly required for cigar leaf.

SECTION II.—CULTIVATION AND CURING IN THE NORTH

After transplanting, the cultivation must be often enough to kill weeds as fast as they appear. The plants may be dressed with the hoe, and grass or weeds too near the plants for the hoe, must be pulled by hand. As soon as the tobacco has become too large to be cultivated without injuring the leaves by the whiffle-tree, the hoes should pass through it, drawing a little earth to the plants where required, and leveling the furrows made by the shovel or cultivator. Care should be taken to leave the land level, for level culture is generally the best. When the plants begin to blossom, select the best for seed. One hundred plants will furnish abundant supply of seeds for a crop of 40,000 pounds. All the others should be topped before they blossom—indeed, as soon as the blossom is fairly formed. It should be topped down to the leaves that are six inches long, if early in the season; but if late, top still lower. If the season is favorable, in two or three weeks after a plant is topped it will be fit for cutting; yet it will not suffer by standing longer in the field. The suckers are now to be pulled off, and the ground leaves saved. The suckers ought to be pulled off before they get two inches long, as they spring out abundantly from each leaf where it joins the stalk. Ground leaves are those at the bottom of the stalk, which become dry, and should be gathered early in the morning, when they will not crumble.

The worms ought to be destroyed as fast as they appear, or they will destroy the crop. Turkeys are the greatest help in this warfare that the planter can get.

CUTTING AND CURING.

When the plant begins to yellow or present the peculiar appearance indicating ripeness, it is time to put it in the house. It is cut off close to the ground, by turning up the bottom leaves and striking with a tobacco-knife. The plants should lie on the ground for a short time, to fall or wilt, and then be taken up and placed in small heaps of eight or ten plants, to be removed in a cart or wagon to the tobacco-house, or to be speared in the field, and then carried on the sticks to the house. There are various modes of securing it in the house—by pegging, splitting, tying with twine, and spearing, the latter now being considered the best and most expeditious method.

Tobacco sticks are small, round and straight, four and one-half to five and one-half feet long. They may be rived out like lath or narrow paling, one to one and one-half inch square, smaller at one end than the other. One end is sharpened to admit the spear. The spear is round, or like the Indian dart in form. It is made of iron or steel, bright and sharp. These sticks are carried to the field, and dropped one at each heap of newly-cut tobacco. The spearing is done by pressing one end of the stick into the soft ground, the spear being on the other end, and with both hands running the plant over the spear and down the stick, thus stringing the eight or ten plants in the heap on the stick. It is then laid in piles, or placed at once on the wagon to be taken to the house, and handed up to the person who hangs the sticks across the joists or beams, placing them twelve or fifteen inches apart, and smoothing the leaves down so as not to let them crumple in the curing, and adjusting the plants on each stick, that one shall not touch the other. As the tobacco cures the sticks may be pushed closer together, to make room for more tobacco and to exclude damp air from the cured tobacco. The tobacco houses should have many doors and windows, so as to admit light and dry air, and, by closing them in bad weather, to exclude the rain and dampness, which materially damage the tobacco, besides injuring the color of it.

After tobacco has been cured and is dry, whenever the weather is mild and damp it will become soft and pliant, and then may be stripped. It is first taken off the sticks and laid in heaps, and then the leaves are stripped from the stalks and tied in bundles of about one-fifth or sixth of a pound each. The bundle is formed by wrapping a leaf around the upper part of a handful of leaves, for three or four inches, and tucking the end into the middle of the bundle. There should be, if the quality of the crop permits, four sorts of tobacco, second, bright, yellow, and dull. When the tobacco is taken down the cullers take each plant and pull off all defective, trashy, ground, and worm-eaten leaves next to the big end of the stalk, and then throw it to the next person, who takes off all the best bright leaves (and if there be any yellow leaves he lays them one side, until he has got enough to make a bundle) and throws the plant to the next, who takes off all the rest, being the dull; and the respective strippers, as they get enough leaves in hand, tie up the bundles,

and throw them apart to keep the sorts separate for convenience in bulking. Stripping should not be done in dry, harsh weather. It is best not to take down more than can be tied up in a few hours. To bulk tobacco requires judgment and neatness. Logs should be laid parallel with sticks or boards across to support the bulk, and allow free passage for air under the bottom.

The bundles are then taken, one at a time, smoothed and spread out. This is most conveniently done by putting them against the breast and stroking the leaves downward, smooth and straight, with the hand. They are then passed, two bundles at a time, to the man bulking. He lays them down, two at a time, in a straight row, and presses with his hands; the broad part of the bundles slightly projecting over the next two. Two rows of bundles are put in a bulk, and both carried on together; the heads being the outside, and the tails touching or barely lapping. The bulk, when carried up to a sufficient height, ought to have a few sticks laid on the top to keep it in place. It must now be often examined, and if it gets warm or has a musty, bad smell, it will require to be changed into another bulk, laying it down one bundle at a time without pressing, so that it may lie loose and open to admit free circulation of air. This is called wind-rowing. After it has become thoroughly dry and has a strong smell it is fit to "condition;" that is, when the moisture or warmth of weather makes it pliant, it is bulked in three or four, or even six-rowed bulks, and covered with boards or sticks and weighted down with logs, etc., when it will keep in nice order for packing at any time.

SECTION III.—INSECTS BENEFICIAL AND INJURIOUS TO TOBACCO.

Among insects that destroy the tobacco worm, the Yellow Jacket, is said to carry off the young larva as winter food for its young. There are several other insects, especially the ichneumon flies, which lay their eggs in the body of the tobacco worm.

Turkeys are very fond of the worm, but the only safe way is to hand pick them during the season of their growth, which is from July or August until the crop is ripe, according to the season and latitude.

THE LARVA OF THE SPHINGES.

The great enemies to the growth of tobacco except the black cut-worm, which eats the young plants in spring, are the larva of two moths, the larger larva of *Macrosila (Sphinx) Carolina*, which breeds up to

about latitude 38 degrees. Farther north its place is supplied by a somewhat smaller, but no less destructive worm, which also infests potato and tomato vines, and also egg plant and other species of the solanum family. About the latitude of 38 degrees, the two insects are found in common, but they never breed together. Of the various insects injurious and beneficial, the Entomologist of the Agricultural Department at Washington, in 1873, has the following, which we transcribe in order that they may be well known:

The tobacco hawk-moth or "horn-blower" of the south, *Macrosila (Sphinx) Carolina*, Linn., is a large moth, the caterpillar of which, commonly known as the tobacco-worm in the Middle States, and is very destructive to the leaf of the tobacco plant, when the worm is young, by eating holes in the leaves, thus spoiling them for use as wrappers for cigars, and when old by devouring the whole of the leaf itself. These worms appear of all sizes, during late summer and autumn, in the tobacco fields south, the first brood of eggs hatch in May or June.

A description of their transformation from the egg to the perfect fly: The egg is deposited singly on the leaf of the tobacco or tomato plant, and the young worm when first hatched out by the heat of the sun, commences to eat holes in the leaf of the plant, and sheds its skin several times before attaining its full size; it then goes into the earth and the pupa is there formed in a subterranean cell, the late broods remaining as pupae all winter, and coming out as the perfect fly the following spring. The insect (Fig. 8) appears from June and July until late fall. It hovers in the twilight like a humming-bird over flowers, especially honeysuckle and Jamestown weed, (*Datura stramonium*), sucking the nectar by means of its long, flexible tongue, which, when the insect is at rest, is coiled up like a watch-spring under the head. The tongue when unrolled measures four to six inches in length, and the caterpillar feeds also on the potato, red pepper and tomato, as well as the tobacco. This insect is almost exactly like the northern so-called potato-worm in all the states of larva, pupa, and insect, and can scarcely be distinguished from it by young entomologists; but in the "tobacco-worm" the anal horn on the tail of the caterpillar is reddish instead of bluish; it also has no longitudinal white stripe, the pectoral feet are ringed with black, the body is more hirsute, and the insect

itself is more indistinctly marked, and always has a white mark at the base of its wings and partly on the thorax, which the moth of the potato-worm has not.

The potato-worm is also found feeding on the tobacco south, and frequently a black or nearly black variety of the worm is taken, especially towards the end of the season. The potato or tomato worm has also been accused of being poisonous, but this is entirely erroneous, as the horn on the tail of the caterpillar is incapable of inflicting any serious wound, and has no poisonous properties whatever. The potato-worm is the northern species, and in Maryland the two species meet, and are found indiscriminately together in the tobacco fields, yet never mixing, but remaining perfectly distinct, although so nearly allied in appearance, habits and food.

There are several parasites, and one in particular, that is very useful in destroying the potato and tobacco worm. It is a minute, four-winged fly (*Microgaster congregata*), which deposits its eggs in the caterpillar, and eventually kills it. The eggs of this parasite, to the number of one hundred or more, are deposited in the back and sides of the caterpillar, in small punctures made by the ovipositor of the fly. The larvæ, when hatched, feed upon the fatty substance, and when fully grown eat a hole in the skin, and each maggot spins for itself a small, white oval cocoon, one end of which is fastened to the skin of the worm, and the caterpillar appears as if covered with small, oval, white eggs. Eighty-four flies were obtained from one caterpillar by Say, and Fitch counted one hundred and twenty-four cocoons on another worm, so that these insects must destroy a great number of worms. The parasite, however, is said to be destroyed by another hymenopterous insect (*Pteromalus tabacum*), which deposits its eggs in the cocoons of the microgaster. Another species, forming an immense mass of loose woolly cocoons, is also said to kill the caterpillar of the potato-sphinx, and most probably attacks also that of the tobacco worm in a similar manner. It is, therefore, of great consequence when destroying the caterpillars by hand-picking to avoid crushing or injuring any cater-

pillars which appear to have either white floss or egg-like cases on their backs or sides, as these are the cocoons of a very useful insect, which, if left undisturbed, would produce multitudes of flies, which would destroy an immense number of these injurious worms.

The hornets, and an orange-colored wasp, taken by Walsh for a *Polistes*, devour the caterpillar when young and small. The best remedy against these insects, however, is to poison the fly which produces either the potato or the tomato worm, by dropping a mixture of "blue stone" of the druggists, or crude black arsenic, into the flower of the Jamestown weed, or stramonium, in the evening, when the fly will come and insert its long proboscis into the flower, sip up the poisonous mixture, and die before depositing its eggs.

A correspondent from Tennessee finds it advantageous to cultivate a few plants of the Jamestown weed among his tobacco, and then to poison the blossoms, as they appear, with the above-mentioned liquid, every evening, and has thereby saved a great part of his crop uninjured. In Maryland some tobacco-growers utilize young turkeys by driving them into the tobacco field, where they pick the worms from the leaves. Some planters also pay a small premium to children for the dead millers or moths, which are readily killed with a piece of shingle or board as they hover over the flowers in the evening twilight.

In relation to the cultivation of the Jamestown weed, a common name for which is stink-weed, we used to raise young plants and remove them to the tobacco field, about twenty-five to the acre, getting them in blossom as early as possible, and poison the blossoms, and thus saved much labor by destroying many moths and thus preventing them laying their eggs. This plant is found growing well north in Wisconsin, and is well worthy of being forwarded like tobacco plants, and transplanted about the fields. The moths are sure to find the blossoms in the dusk of the evening. These moths are often mistaken for humming-birds as they flit from flower to flower in the dusk of the evening.

The Leading Breeders of Ontario.

Peter Forhan, of Wallaceburg, is a breeder of standard bred roadsters. He has a large farm adjoining the village, on which he has made a handsome race-course, where he has his horses trained. He has ten fine brood mares and many promising colts. His standard bred stallion, Prince Edward, register No. 1424, 15½ hands high, weight about 1,100 pounds, is a credit to the owner. He has several young horses which have done better than three minutes. As a breeder Mr. Forhan is a representative man of this part of Ontario. As a man of honor and fair dealing he has no superior. Parties in search of a good horse would do well to correspond with him.

Wheeler & Smith are breeders, importers and exporters of horses and cattle, also market men at Chatham. Mr. Smith gives his attention more to the exporting of cattle, while Mr. Wheeler looks after the fast horses. His stallion, Coaster, standard by breeding and performance record 2:26½; his pacing stallion, Chestnut Island, bred by W. C. Christy, of Kellerton, Iowa, sired by Blue Bull; his thoroughbred stallion Chancellor, sired by Terror, he by Burke; and his Clydesdale stallion, Young Wonder, bred by J. P. Wiser, of Prescott, Ont., are all worth seeing and reflect credit upon their owners.

C. O. Keys & Sons, Palmyra, are importers and breeders of French draft horses, Berkshire pigs, registered Shorthorns, Southdown sheep, Bronze turkeys and Wyandotte chickens. They deal in pure blood stock only. They now own Pegase, 5,347, (668) Imported French draft stallion, which cost them \$2,500.

S. J. Attridge, Highgate, is of the firm of Lee & Attridge, importers and breeders of Clydesdale horses and Shorthorn cattle. They now own Doubt Not, 3569, foaled June 1, 1882, bred by David A. Hood, Balgredan, Scotland. Doubt Not gained first prize at Dalbeattie, in 1884; first at Newton, Stewart, same year, out of a class of 38 of the best in Scotland. He has been twice shown in Canada, carrying off first prize.

Thomas Fairbanks, Chatham, is a well-known breeder of fast horses. He has the present season the following stallions: Old Hooker, Protection, Blenkiron, imported and registered in American and English stud books. Mr. Fairbanks has been a breeder for nearly twenty years and finds by owning first-class brood mares and using his own horses he is always sure of good colts. At his sale last year of forty-six head he realized over \$7,000. As a breeder his reputation has extended beyond his own country.

J. H. Wilson & Son, the oldest veterinary establishment in Western Ontario, both father and son being graduates of the Ontario Veterinary College. The senior of the firm settled in London in 1868, and at that time was the only legally qualified V. S. west of Hamilton. His close attention to business and long experi-

ence has won for him a name always to be remembered in veterinary circles. Office 99½ King Street, London.

James Miller & Son, Mooresville, are importers and breeders of Scotch Clydesdales. Since 1882 they have made a specialty of the above breed of horses and have bred some superior colts, besides being the means of introducing into this country some of the best stock horses of this locality. As breeders and importers they have more than a local reputation.

Robert McEwen, Alloway Lodge, Byron P. O., County of Middlesex, Ontario, says: "In 1882 I sailed for Scotland to purchase a few Clydesdale fillies, with which to make a beginning in the breeding of draught horses and that venture I have never once regretted. Prices at that time were running high on account of the great demand, and good, well-bred specimens were hard to obtain; however I succeeded in buying and finally in landing here safely a thorough going three year old 'Lord Lyon' filly and a very thick-bodied, flat-legged mare by Young Prince of Wales. Two years after an addition was made to this selection by the purchase of a big aged Loch Fergus Champion mare out of which a colt had been sold to go to Australia at £250; and the now well-known stallion 'The Times' who has earned for himself as a stock getter and a prize winner a very enviable reputation. That this country is adapted for the rearing of these horses one has only to look at the uniform specimens I have bred or those of many other breeders in this neighborhood to be readily convinced. The Clyde crosses the most successfully with Canadian mares in producing agricultural and general purpose horses, and this is shown by the constant demand for them and the extra money paid by American and other buyers for all animals containing a drop of the blood. Their prepotency is remarkable, never failing in the first cross even, to mark in a greater or less degree their progeny with many of the characteristics of the breed. In comparison with other draught horses Clydesdales are noted for their good temper, free action, hardness, flat bone, sound feet and that absence from sluggishness too often observed in certain classes where size has, apparently, been the sole aim of the breeder. By all means I should recommend the use of the Clydesdale stallion for the improvement of our stock of farm horses."

J. D. O'Neill, Veterinary Surgeon, London, Ont. Ex-President, Ont. Vet. Med. Association, Toronto. Importer of Clydesdale horses, breeder of Clydesdale and carriage horses. First-class stallions always kept in the stud in both the above classes. Horses bought and sold on commission. The celebrated stallions, "Reuben Wilson" (3952) C. S. B., Vol. VII; "Normandy" (5225) C. S. B., Vol. IX; and the carriage and roadster stallion, "Highland Boy" (the winner of many first prizes) are in the stud this season. Correspondence from intending purchasers will receive prompt attention. Satisfaction guaranteed. Fifteen years' experience in active practice.

H. A. Patteson, Wood Lawn Stock Farm, Lots 101 and 102, Talbot Road South, Township Howard, (business address) Chatham, Ont., is a breeder of trotting and running horses. He owns stallion, Lord Chester, (see American Stud Book) and Arabian stallion, Black Emperor or "Sultan." He breeds from mares without blemish and has young undeveloped stock always for sale. Mr. Patteson, who is mayor of Chatham for his second term, is an enthusiastic horseman, and takes a great interest in breeding. He also breeds Shorthorn cattle, Berkshire pigs and Southdown sheep, but he gives the greater part of his attention to horse breeding. His farm is beautifully situated and well watered.

Abraham Smith, merchant tailor of Goderich, importer and exporter of standard-bred horses. Mr. Smith has long been known as one of the best horsemen of this part of the country, and has done more toward the improvement of roadsters than any man in this part of Ontario. He often has forty head and for many years has visited the various State Fairs of the Union, sending one or two car loads of his choicest stock. His exhibit usually secures at the fat stock show at Chicago, where he disposes of his prize winners. Mr. Smith has several branches, where his stock is raised and trained.

J. J. Fischer, Benmiller, is owner of Horncastle Farm and the Pioneer Importer of Heavy Draft Horses in this part of Canada. One of his first importations was England's Glory, many of whose descendants can be found in this locality to this day, and are a credit to the original stock. Young Peacock was next imported and shown at the Centennial, where he took a diploma and a bronze medal. General was sold by him for \$2,000, since for \$4,500 and is now in the States. King of the Dominion, John Bull, and many more celebrated horses have been brought out by him. His present farm consists of 400 acres, which he personally superintends.

William J. Wenfer, originator and leading breeder of the "St. Clair" Strain, of Plymouth Rocks, has also excellent Wyandottes, Langshans, White Dorkings, and extensive yards situated on the shore of Lake Huron, about two miles from the town of Sarnia; P. O. address: Point Edward, Lambton Co., Ontario, Canada.

E. A. M. Gibson, Delaware, Antioneer and Land Agent. Pedigreed Stock a specialty.

David Fisher, owner of the Lake View Stock Farm, Goderich, is an Importer, Exporter and Breeder of Clydesdale, English Draft and Cleveland Bay Horses. His present stock consists of over forty head of pure bred and registered stock, of which number fourteen are stallions. Twelve years since he adopted the plan of showing his stock at various fairs in the States. At the Centennial he was awarded diplomas and medals. He has never left a fair without taking with him his full proportion of medals, prizes and honors. When visiting the fairs he usually takes two car loads of horses. Here he many times disposes of his prize winners. Few men in the States or Canada are so well and favorably known, being thoroughly conversant with his business. Conscientious and of a pleasant disposition he manages to derive more pleasure and profit out of his business than usually falls to the lot of man.

A. M. Polley, Goderich, for many years has been the largest shipper of horses in this locality. He sells principally in the N. W. Territory, Chicago, Michigan and Pennsylvania. He has the best built and equipped livery stable in Western Ontario. He rarely has less than fifty horses at a time. His standard bred mare, Elsie Groff, 2:24½, and his thoroughbred Sago mare, Lady Maitland, and his stallion, Ike Groff, will indicate the quality of stock he is breeding. Few men are so favorably or honorably known. Horses purchased on commission.

J. P. Fisher, Anbarn, Hotel Keeper and Importer and Dealer in thoroughbred horses. Mr. Fisher has been engaged in importing and dealing in thoroughbreds for the past seventeen years. Among the stallions he has owned he still retains the imported stallion, Lord of the Manor, No. 2971, Vol. 6, C. 8, B. G. B., sire d by Lochryan (1470) V. 1. 3. He is an English Shire and one of the best in the County. He also owns "Mossed," alias Bob O'Link, sire Lincoln (1350) and part owner of the blooded stallion Whalebone. In 1876 Mr. Fisher exhibited the celebrated Pat Maloy at Philadelphia Exposition, where he took two prizes and two diplomas.

George Whitely, Searforth, breeder and dealer in standard bred horses, owner of Clear Grit for many years prior to his death. Present owner of the imported standard bred stallion Carlisle, record 2:40½ at two years old. He has Florence G., record 2:30½, by old Clear Grit, dam by Black George, he by Royal George. Besides several standard bred colts he also has the imported Clydesdale stallion, Welcome which is said to be the largest boned and best feathered horse in this country.

D. D. Wilson, of Searforth, is the largest Exporter of eggs in Canada. He annually sends abroad 160 carloads. He is also a breeder of roadsters, his stallion Young Grit, sired by Old Grit, being a promising young colt. He has a fine flock of registered Shropshire Downs, which have been prize winners at many exhibitions.

J. B. Whitely, M. D., is the leading physician of breeder of road ters. At present, he has a "Clear Grit," and a stallion and some fine brood mares. He does not allow his fancy for horses to interfere with his profession.

John T. Dickson, Searforth, breeder of registered S. H. cattle and Shropshire down sheep, they being pure breeds from imported stock. At his last public sale his stock averaged over one hundred dollars per head. He is recognized as one of the best breeders. His travels in Europe have enabled him to combine the most improved ideas in his stock raising.

G. Irvine & Sons, Palmyra, importers and breeders of French draft horses. Their stallion Athis 5282 (6771) recorded in France and America in the Percheron Stud books is one of the best of its kind. They have imported several brood mares, but lately, losing one for which they paid one thousand dollars cash. They have others on their place equally good.

A. H. White, Raleigh Tp., Kent county, is owner of "Mapleton Grange Stock Farm," and is a breeder of registered Poland China pigs, Southdown sheep, draft horses and roadsters. Mr. White can always be found at the Provincial and Dominion fairs, he being general superintendent of the Provincial exhibition, which position he has held during the last five years. He has taken several diplomas, medals and first prizes on his stock, and is personally known to all prominent breeders in Canada. His good stock and good nature always insure him many friends and prominent positions relating to fairs.

C. Walker, licensed auctioneer, Ailsa Craig, and owner of the celebrated trotting horse Victor, record 2:21½. Victor has made the grand circuit of the States, winning many prizes, and is now in 1887 doing Canada. This record was made at Cleveland. Mr. Walker and his horse Victor are well known to every horseman in the States and Canada, where his dealings are extensive.

John Eynon, Ailsa Craig, of the firm of Eynon & Hey, importers and breeders of standard-bred horses, present owners of Western Sprague, sired by Governor Sprague 444, record 2:20½. Mr. Eynon has a standard-bred mare, Lady Shepherd, dam by Rysdyk, sired by Chicago Volunteer. Mr. Eynon has owned some of the best horses in Canada.

Importer and dealer has been thoroughbred stallions in Lord of the air d by Lock and one of the sed," alias Bob owner of the Fisher exhibit Philadelphia Exposition.

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Capt. J. W. Steinhoff, of Wallaceburg, breeder, banker, lumberman and farmer, is the leading spirit of this place. He owns several steamboats and has his private yacht, with ten state rooms. The Captain, in every sense of the word, is a self-made man. He is just in the prime of life, and a more genial, hospitable man is rarely found. His stove and heading mill cuts daily 75,000 staves, 25,000 hoops, 2,000 sets of heading. Being one of the largest landholders in the county, and having a taste for fine stock, he is doing more toward improving the breeds of cattle than any man in this locality.

King & Son, Veterinary Surgeons, Dresden, Ontario, treat all diseases of domesticated animals. Calls promptly attended to. Offices opposite Methodist church, Dresden, and McAnn's block, Wallaceburg.

D. MacArthur, B. A., Veterinary Surgeon, graduate of Ontario Veterinary College, Main street, Ailsa Craig, Ont. Special attention given to veterinary dentistry: horses and colts trained to drive single and double, and broken to saddle. Breeder of registered Short Horses. Proprietor of Ailsa Craig lively, sale and exchanges tables, Main street, Ailsa Craig.

A. E. Thompson, Forest, Veterinary Surgeon, graduate Ontario Veterinary College; all diseases of domestic animals treated on the most modern principles.

Isaac Adams, Sarnia, is the recognized scientific horse-shoer of the town. Few men have had better opportunities to gain a thorough knowledge of their business, he having been three years with Bond's Veterinary and Shoeing Establishment, Toronto, and having done the shoeing for Dr. A. Smith, the principal of the Ontario V. S. College, Toronto. He was also foreman horse-shoer for the Toronto Street Railway Co. Toe-weighting and plating done in different styles. All diseases of the hoof scientifically treated.

Joseph Ellison, Sarnia, proprietor of the Farmer's Exchange, importer and dealer in standard-bred horses. He deals quite extensively in the States and is well and favorably known to the sporting world. He owns Carrie C. c. m., sired by Red Chief, he by Mambrino Clark Chief, dam by Richelieu, second dam by Alexander's Edwin Forest. This colt was shown in the Blue Grass Region in 1886 and out of ten foals took eight first and two second prizes. He also owns Ironwood, s. g., by Nutwood, dam Duchess May Rysdyk's Hambletonian.

John McDougall, Ex M. P. Point Edward, caretaker at the quarantine, is well and favorably known as being a careful and conscientious man. He says all cattle and hogs for breeding purposes that are brought into Canada must stop here or at Quebec. The cattle remain in quarantine for ninety days and the hogs twenty-one days. Horses and sheep are not detained. No stock is received in quarantine which shows signs of disease. The owners of the stock are charged with the keeping while in quarantine. Mr. McDougall lives in a pleasant locality.

B. McMechon, Sarnia, is a breeder of registered Short-horn cattle, pure bred Clydes and French Draft horses, crossed with the Clyde. He has over twenty head of cattle registered or eligible for registration. His bull, 7th Duke of Mazurka, is recorded in three herd books. One of his cows, 9th Duchess of Moore, No. 807, vol. 9, will show the quality of his stock. He always has superior breeds for sale.

Thomas Hey, Chemist and Druggist, Ailsa Craig and of the firm of Eynon & Hey, importers and traders of standard bred trotting horses, late owners of Chipeacket, 2290, and present owners of Western Sprague, 2289. Dak. Bay horse, bred by B. J. Treacy, Lexington, Ky. By Governor Sprague, No. 440, 5 year old, record 2:20½, sire of eleven, with records from 2:18 to 2:30.

1st dam Mamie West by Allie West, No. 935, 5 year old record 2:25, sire of Jewett, 2:14 and five with records better than 2:30. 2nd dam Madam Headley, by Edwin Forrest, No. 851. 3rd dam by Mambrino Chief, No. 11, sire of Lady Thorn, 2:18½ and six with records better than 2:30. Mr. Hey owns Egotism bay mare, foaled 1880, bred by R. S. Veech, Louisville, Ky., sired by Princeps, No. 536, 1st dam Belle by Volunteer, No. 55, 2nd dam Flora Belle, 2:22½. Sunrise, chestnut mare, foaled 1876, sired by Strathmore, 408, 1st dam by American Clay, 34, 2nd dam by Ashland Chief, 751. Bay stallion foaled May 1887, bred by T. Hey, sired by General Hancock, 1165, (son of Geo. Wilkes, 519), 1st dam Sunrise, by Strathmore, 408, 2nd dam by American Clay, 34, 3rd dam by Ashland Chief, 751.

C. Darling, Ridgeway, importer and breeder of standard bred horses. He now has the following stallions: Brinker Sprague, 6659, Vol. 7, Wallace studbook, U. S., sired by Governor Sprague, No. 444, record, 2:2½; and Abdullah, imported in 1881, bred by Gen. William Withers, Lexington, Ky. He has several fine brood mares and is doing much toward the improvement of the trotting horses of Kent County. He is also engaged in the breeding of short horn cattle.

Nims Bros., Ridgeway, are Importers and Breeders of Standard bred trotting stock. The many good horses they have owned have given them a wide reputation. In 1886 they lost one imported stallion, Bonair, valued at ten thousand dollars. They now have Almedim, No. 3484, imported; Orontes, imported; and Norman Clay, bred by themselves; also several good brood mares.

tion near Lake Huron where he can personally superintend the management of the stock. He has made a reputation for his kindness and attention to stock under his management, and usually has about seventy-five head in quarantine.

E. P. Westell, V. S., Point Edward, is a government official and an officer of the Grand Trunk R. R., being the inspector of stock at Point Edward passing quarantine; also stock shipped through Canada by rail. By his good judgment, accurate diagnosis and courteous treatment, he has justly gained the confidence and respect of the importers and shippers of stock.

HURON COUNTY.

Amos Fisher, of Benmiller, is a breeder of English Shire and Clydesdale horses. For his imported brood mare Cambridge Lass he paid five hundred dollars when she was but two years old. This mare has taken many prizes. Mr. Fisher has the reputation of owning good stock.

John Rossier, of "Cherrydale Farm," Benmiller, is a breeder of registered shorthorns and owner of the Hambletonian trotting stallion Huron Chief. He owns several good stock farms in Huron county and is also a large owner in Middlesex county. His farms are all well stocked. Mr. Rossier engages in stock farming quite as much for pleasure as profit.

Gordon Young, of Carlow, has a herd of high grade Ayrshire cattle. His registered bull Laddie is the only pure bred Ayrshire in this part of the country. Mr. Young has a dairy in which he makes seven tons of cheese annually, its quality commanding the highest market price. Mr. Young is one of the earliest pioneers of Huron county and has lived over fifty years on his present homestead.

Donald Campbell is a blacksmith and practical horse-shoer at Walton. All his work is done on the most approved plan and diseases of the foot are made a specialty. All his work is guaranteed.

Wm. Beirnes, Victoria Hotel, Walton, is a breeder of roadsters. He owns Mollie B, sire d. by Clear Grit. Mollie B is mother of three promising colts, one from Abdullah, one from Kentucky Star, and one from Curtille. Kentucky Star has shown a 2:30 gait. Mr. Beirnes is also an experienced trainer, having a fine half-mile track on his farm.

W. F. Clark is a veterinary surgeon at Dunlop. He is the owner of the celebrated imported Clydesdale stallion Collin, who has taken prizes both in Scotland and Canada. Mr. Clark is a graduate of the Veterinary College, Toronto, and a pushing young business man.

Wm. McLean, of Goderich, is an exporter and dealer in cattle and roadsters. Many years experience tells him that high grade shorthorns are the most profitable for producer, shipper and consumer. His fine residence is beautifully situated in the midst of green lawns and well-kept flower gardens.

J. Aikenhead, veterinary surgeon of Goderich, is a graduate of the Ontario Veterinary College of Toronto. He is government inspector of stock for West Riding of Huron. Mr. Aikenhead is a breeder and owner of Royal George horses.

Robert Sprung, Hullett township, is a wide-awake young farmer and owner of the imported Shire stallion Gay Lad (3132). Gay Lad is a handsome dapple gray, seventeen hands high and weighs 2,110 pounds. He is one of the best bred stallions in Ontario, there being thirteen crosses on the sire's side.

Joseph Morris, Colborne township, is one of the representative farmers of his township, having a fine farm under a high state of cultivation, two and one-half miles from Goderich. Mr. Morris believes in keeping up with the times, and is rapidly improving the grade of his stock both in cattle and horses.

Robert Thompson, of Goderich, a horseshoer and farrier, has the confidence and trade of the importers and breeders of this locality. He is a thorough workman and treats weak heels, sand cracks, quarter cracks, drop soles, corns and interf ring in a scientific manner.

J. A. Ferguson, blacksmith at Auburn, does the work of the importers and breeders of fine horses in his section of the county. All diseases of the hoof are treated successfully by him.

Isaac Fisher, of Colborne township, Goderich post-office, is a breeder and dealer in registered shorthorns. Although a beginner, he has started with a very choice herd. His imported bull Albert is registered in the English and British-American short horn herd books. His imported cows, Rosabel and Clementina's Gem, show the quality of his stock. He has one of the best farms in his locality.

Anthony Allen, Dunlop Corners, Dunlop post-office, is an importer and breeder of thoroughbred horses and owner of the celebrated young Clydesdale stallion Dauntless; 3:55, C. S. B. He is a bright bay and a descendant from the best Clydesdale horses of Scotland. Mr. Allen and son are now arranging to bring some fine horses from Scotland this season, his son being there now to make purchases. They handle superior horses.

Michael Schwanz, of Colborne township, Benmiller post-office, is a breeder of shorthorn cattle and grade Clydesdale horses. He owns the bull, Duke of Bridge-water, bred by H. Elford, of Holmesville. Mr. Schwanz is one of the progressive farmers of his township.

Alexander Young, of Colborne township, Carlow post-office, is a breeder of shorthorn cattle and roadsters. In 1834 Mr. Young settled on his present home-stead, and has seen the county grow up and a generation pass away. He owns four hundred acres of land.

C. Fisher, of Benmiller, is a carriage and wagon-maker and general blacksmith. He has large and comfortable shops and commands the trade in his neighborhood. He keeps ready-made work always on hand.

D. C. Strachan, of Goderich, is a dealer in groceries, crockery and glassware. Mr. Strachan is one of the enterprising business men of the place and owner of a fine blooded mare. She was sired by old Toronto Chief; her dam from Black Jack. She has made a record of less than three minutes, and has raised a number of fine colts.

W. M. Quigley is a blacksmith and practical horseshoer at Kingsbridge. He is a young pushing mechanic who is thoroughly posted in his business, and believes in building up a trade on the quality of work turned out. He has been located at his present quarters since 1887 and is the "boss" horseshoer of his section of the county.

R. J. H. Delong, proprietor of Royal Hotel, Port Albert, is one of the young enterprising business men of Huron county and for the past seven years has been proprietor of the above hotel. He has a happy way of making his guests feel perfectly at home. He is also an auctioneer of the county and any letters mailed to him will receive prompt attention.

Alexander McNeil, Colborne township, is a farmer and breeder of registered shorthorns. Mr. McNeil has a fine farm of 300 acres and has given his attention to the breeding of fine stock. He now owns the fine shorthorn bull, Evening Star by Highland Chief, and a fine thoroughbred heifer, besides a fine lot of grades. He also pays considerable attention to sheep industry and owns some of the best grade draft horses in the country.

Thomas Dougherty, Shephardson post-office, is a thriving young farmer who has just commenced the breeding of registered short horns by crosses with heavy draft thoroughbreds. He owns the promising young registered bull, Duke of Ashfield by Favorite. Mr. Dougherty and father have been quite extensively engaged in dealing in cattle for a number of years.

John McLean, farmer and stock breeder, Dunganon post-office, has a fine farm of 300 acres under a high state of cultivation, and for the past twenty years has been engaged in raising high grades in both cattle and horses. He has also been extensively engaged in buying and shipping and owns a fine imported shorthorn bull, which is registered in the Dominion shorthorn herd book.

John Hewitt, of Walton, is a breeder of shorthorns. He bred the celebrated Duchess of Walton, Maid May and Blossom, sired by Lord Lorne, dam Flora McDonald. Mr. Hewitt owns some thoroughbred Southdown sheep. Persons can communicate with him at his post-office, Walton, or can call at his stock farm, Mt. Pleasant.

James Hays, of Seaforth, is a breeder of roadsters. He has some fine brood mares, many of whose colts have been sent to the States. Mr. Hays has held many public positions and is now Reeve of McKillop township.

Wm. Hawkshaw, of Seaforth, is the owner of the imported Clydesdale stallion, General Gorley; 5031. He has some fine roadsters and one of the smallest Shetland ponies in Canada. He is proprietor of the Hawkshaw House, which is near the depot and well patronized by horsemen.

D. C. Torrance, of Seaforth, is principal of the Lead-bank. He is a breeder and dealer in roadsters, having several well bred young horses. Persons desiring a good stepper should correspond with him.

John F. Dale, of Seaforth, owner of the Maple Home stock farm, is an importer of Clydesdale horses and an exporter of cattle, having followed this business the last twenty years. He is also a breeder of high grade shorthorns and pure bred Leicester sheep and Berkshire and Suffolk pigs. His imported mare Violet is a fair sample of his horses.

John Ward, of Seaforth, is a manufacturer and dealer in all kinds of harness and trunks. He is the owner of the trotting stallion Mohawk Chief, record 2:47½, sired by old Clear Grit, he by Lapidist. He is considered one of the finest stallions in these parts.

Jonathan Miller—about six miles from Goderich on the banks of the Maitland can be found that quaint old village Benmiller. The well kept hostelry is presided over by Jonathan Miller, son of the founder of the place. Amid the sound of ever-falling waters in this health-giving atmosphere the invalid or tourist can secure the rest and seclusion so anxiously sought and so rarely found. Spring brooks and speckled trout, beautiful ravines and romantic scenery endear the place to the memory of the sportsman and the loiterer.

Wm. Pinkney, of Seaforth, is owner of Robert Bonner, Jr., sired by Robert Bonner, record 2:21, a young Clear Grit stallion, dam by a Revenge mare. Mr. Pinkney also owns an imported Shire horse and ranks as one of the horsemen of the country.

Thomas Lapslie, of Seaforth, owner of Fairview Park, is a breeder of standard bred roadsters. He has some of the best young horses in this part of the country and is generally recognized as one of the best breeders. His farm joins the town.

John S. Platt is the owner of the Platt Salt Block. The business was established in 1867. Mr. Platt's father being the original discoverer of salt in Canada. The works are situated on the banks of the Maitland. The well is 1,075 feet deep, and capacity of the block is 60,000 annually, coarse and fine table and dairy salt being made. Their market is in Northwest Territory and throughout Canada.

Dr. C. Beale, of Dublin, treats all diseases of domestic animals. He has been in the profession sixteen years, ten of which have been spent in Dublin, where he has built up a fine practice.

Gregory Bruner, of Dublin, is a manufacturer of wagons, carriages, sleighs and cutters. He has experienced workmen, and uses the best of material. He does general blacksmithing and horse-shoeing and treats diseases of the hoof.

James McTeuch, of Egmondville, is the owner of the shorthorn bull, Baron Hero, No. 12,295, vol. 9, C. S. H. B. This bull has taken many first prizes. Mr. McTeuch also owns a good herd of grade cattle.

Gao. E. Henderson, of Seaforth, is a manufacturer and dealer in all kinds of harness, and carries a large stock of trunks and hand bags of all sorts. He is agent of the Confederated Life Insurance Co., of Toronto, and secretary of the Trotting Association of this place.

Whitely and Abell, of Seaforth, are liverymen and claim to keep the best rigs in town. They furnish good rigs for commercial travelers, at moderate rates.

James W. Elder, veterinary surgeon, has his office and infirmary in Seaforth. He is a graduate of the Ontario Veterinary College, and may be consulted on all diseases of domestic animals. He examines horses as to their soundness and buys and sells on commission.

James Mitchell, of Goderich, is editor and proprietor of the *Star* and Secretary of the Dominion Draught-Horse Breeders' Society, incorporated in 1880. The society files a long-felt want and meets with warm approval and satisfactory encouragement.

Patrick Farr, of Dublin, is owner of the thoroughbred stallion, Goderich Chief, record 2:37. Goderich Chief was sired by Erin Chief, he by Royal George. His dam was an imported mare, sister of Lucy, who sold in Cleveland for \$15,000. Mr. Farr has the imported brood mare Endor, a Tontine mare by Tontine, and several standard bred colts.

W. A. Colborne, of the firm of Colborne Bros., Goderich, is owner of the Kentucky bred roadster, Endor Downie, sired by Alamo, he by Almont, he by Abdullah. She was bred by Col. Withers on Fair Lawn Farm. Mr. Colborne is a good judge of horses and always keeps a good stepper on hand.

Thomas Swartz is proprietor of the livery and hack exchange stables in Goderich. He supplies carriages for weddings and funerals and furnishes fine turnouts at reasonable rates.

Robert McLean, of Goderich, is a market man and dealer in cattle and horses. His stock is shipped to Liverpool, London and Glasgow. His hams, bacon and side meats have given him a wide-spread reputation and as a result his business has been eminently successful.

T. & J. Story are proprietors of the leading grocery and commission house of Goderich. This firm has established connections in various parts of Ontario by which they are able to handle all kinds of produce on commission. They guarantee reasonable charges and prompt returns, and solicit correspondence.

John Yule, Chief of Police of Goderich, has held his position for the past seven years. He was born in Perth, Scotland, his father being for many years champion oarsman of the British Isles. Mr. Yule is as yet a young man, but has made a reputation as an astute detective, having worked up several important cases.

James Davidson, of Colborne township, Goderich, is the owner of the Spring Brook Farm, and a breeder of English draught and Clydesdale horses. He has good brood mares and is breeding some fine colts. Persons desiring such horses should address him.

John A. McBride is proprietor of the Albion Hotel, Goderich. This hotel has all the modern improvements, electric bells, baths, etc. The rooms are large, pleasant and well furnished. During the last six years, under Mr. McBride's management, it has become the leading and popular hotel of Goderich, patronized by commercial men and tourists.

George Tindale, of Auburn, is the owner of the imported Clydesdale stallion, Prince Arthur, for which he paid twelve hundred dollars. Mr. Tindale has the reputation of keeping good horses.

James Young, of Colborne township, Dunlop post-office, is a model farmer. He has a model farm and is introducing pure bred and registered animals throughout his entire stock.

Wm. F. Young, of Colborne township, Dunlop post-office, is a breeder of Clydesdale horses and grade cattle. His Canadian bred stallion, Donaki, whose grandsire was imported, is a handsome horse. Mr. Young has several good brood mares and is well known as a breeder.

Robert Beacom, of Porter Hill, has been a breeder of Cleveland Bay horses for the last fourteen years. He has exhibited his horses in the States and Canada. He raised Occidental 2d, whose dam was sired by Old Peacock. He has sold many good horses in the States and Canada and now has some promising colts by Old Peacock.

Wm. Elliott, of Ash Grove Farm, Porter Hill, is a breeder of Cleveland Bay and Clydesdale horses. He is the owner of Mahogany Tom and Favorite Johnnie, both first prize winners.

Isaac Salkeld & Sons are owners of the Walnut Farm, Goderich township. They are breeders of registered shorthorn cattle, Clydesdale horses, Southdown and Leicester sheep and Berkshire pigs. Their farm is well adapted for their business. They pride themselves on their pure bred stock, and are classed among the best breeders of this country.

John Salkeld, owner of Maple Grove stock farm, near Goderich, is a breeder of registered Clydesdale horses and Shropshire sheep. His farm is watered by a living spring, is well adapted for grass, convenient for shipping by boat or rail and has sufficient timber. On this farm, which is now offered for sale, can be found horses which have won many prizes. Address Goderich.

John Andrews is owner of the Lakeside stock farm, Goderich. He is a breeder of the registered English Shire horse, pure bred Berkshire pigs, shorthorn cattle and Shropshire Down sheep. He is a model farmer and his well-kept farm has made him an extensive reputation.

Joseph McCluskey, Goderich, is a breeder of Clydesdale horses and shorthorn cattle. He has some good grade cattle and young horses. He is a practical, self-made man, and as a farmer has made a success of his business.

Stewart McDougall, Porter Hill, is an importer of Clydesdale horses and owner of Glengarry 2d. He also owns a pure bred Clydesdale stallion sired by Fearnot (2,100), dam by old Lord Haddock. His mare, Lucy B, sired by old Clear Grit, a Royal Revenge mare by Tontie and others of this class will indicate the character of his stock.

Geo. Sprout, of Boreland stock farm, Seaforth, is a breeder of registered shorthorns and for many years has been quite extensively engaged in this business. Among his fine herd may be found some choice animals, viz: Lord Herbert (1,659, vol. 8); British Statesman 2d (1,587, vol. 6); Meg Merrilies (284, vol. 4); Bracelet (197, vol. 3). He also has many fine grades, and his stock is among the very best in Huron county.

John McKay & Sons, proprietors of Hillside Farm, are breeders of registered shorthorns and Clydesdale horses. They have a fine herd of shorthorns. The following are the cream of the flock: Bramar Prince, Moss Rose 2d, Lady Dora, Lily Maid and Bracelet. They also own a fine mare sired by Royal Revenge and a descendant of Blackhawk, Morgan and Messenger. They have a colt from this mare, sired by Fulton, he from imported stock.

John Stafford, owner of Prospect Hill stock farms, Walton postoffice, is a breeder of registered shorthorn cattle, Clydesdale and road horses. Among his stock may be found one of the largest bulls in the county, Cota (13,440). Miss Webb (675, vol. 8). Miss Walton, Rose of McKillop and others. Mr. Stafford is one of the leading breeders and is thoroughly posted in veterinary matters, and has performed some of the most difficult operations with success in this part of the country.

George Green, Goderich, is a breeder of registered Percheron horses. His stallion, Brilliant (6,229, vol. 4), and a brood mare foaled on board ship are fine animals. He owns Tontine, Jr., sired by old Tontine. In 1886 Mr. Green sold a horse for twelve hundred dollars. He is one of the few breeders of Percheron horses in this locality.

F. J. Breen, Limerick postoffice, farmer, breeder and importer of Clydesdale horses, recently imported a very fine young mare, Forest Queen, by King of the Forest (1,170, vol. 2), dam Mettle (3,248, vol. 7); also young stallion, Crown Gun, by King of the Forest (1,170, vol. 2), dam Young Jean (1,031, vol. 5).

Andrew Drysdale has a fine farm of 160 acres on the Huron road near Goderich. He was for many years herdsman at Bow Park farm and also managed Oak Hill farm, owned by Chauncey Andrews, of Ohio. He is a thoughtful, intelligent man and a scientific farmer. He quietly accomplishes with his knowledge that which costs others much money and hard work.

D. Donovan, of Seaforth, is a dealer in horses. He has been engaged in this business for the past seven years and is one of the enterprising horsemen of Seaforth. Persons wishing to buy or sell horses will do well to communicate with him.

Alexander Davidson, of Seaforth, is the importer of Magician, from which he has a fine young stallion, dam by a Clear Grit mare. At Thornton Hall, his breeding farm, may be found many promising colts and fine brood mares. His registered herd of shorthorns are a credit to the land. He is known as one of the oldest and best breeders in the country.

John McNevin, Woodham postoffice, present proprietor of Imperial Flouring Mill at Woodham and breeder of trotting and road horses of the well-known Hambletonian and Tipple breeds, and one of the owners of the imported Clydesdale stallion, Joe (1,461).

Thomas Berry, Hensall postoffice, dealer in horses and proprietor of a sale and exchange stable at Hensall, owner of the imported Clydesdale stallion, Auchencrain (No. 4,815, vol. 9), foaled April 15, 1885, color brown, with small stripe on face and one hind foot white, sixteen hands high, sired by Belted Knight (1,395, vol. 3), dam Daisy of Girdlingwood (2,442, vol. 6). Mr. Berry is also part owner of two other imported stallions, Joe (1,461, vol. 9), by Belted Knight also, and Good Cheer (1,678, vol. 4), by Farmer (286, vol. 1) dam Neil. Mr. Berry is also an extensive exporter of cattle and sheep.

James Cooper, Kippen postoffice, importer and breeder of Shropshire sheep, keeps on hand a large stock of sheep, all pure bred, and either imported or bred by himself from imported stock. Has exported a number to the Western States; also breeds heavy horses.

Thomas Woodley, Brucefield postoffice, breeder of Clydesdale horses, owns imported and registered mare, Queen of Beauty, which is his principal brood mare from which he is raising some good ones.

Hugh McDiarmid, Brucefield postoffice, breeding pure bred Clydesdale from imported registered stallions and his imported mare, Rebecca (4,333, vol. 7), sired by Ivanhoe (396, vol. 1); also breeding roadsters.

Messrs. Peter and John Cameron, Brucefield postoffice, breeders of Shorthorn Durhams, pure imported stock and all registered in N. D. H. B.; also grade Holstein cattle and general purpose horses.

Wm. B. Smillie, Brucefield postoffice, of Smillie Bros., dealers in horses and owners of the pure bred Clydesdale stallion, General Gordon (5,930, vol. 9), sire Lyon Get (2,984), dam Rebecca (4,233). Foaled May, 1884, a beautiful dark bay without any white marks. Good bone, style and action.

Wm. Sinclair, Chiselhurst postoffice, is a prominent farmer and breeder of heavy draft horses and good grade cattle. Has an extra fine brood mare that has taken a number of first prizes.

John Gray, Chiselhurst postoffice, importer of Clydesdales. In Feb., 1887, imported Jim Crow (4,157, vol. 8), sire Leslie Lad (2,220, vol. 1), dam Dainty (4,070, vol. 7), and a two-year old called "Nick-a-Tino; see vol. 10. Both very good horses.

John Glenn, Tamley postoffice, breeds first-class registered shorthorn cattle, heavy draft horses and Southdown sheep.

Thomas Coates, Exeter postoffice, breeds pure bred shorthorn Durham cattle direct from imported stock of the best class. Mr. Coates' stock is registered in the D. C. H. B. Is largely engaged in exporting cattle to England. Is a reliable breeder and dealer.

John Loadman, Exeter postoffice, farmer and owner of the import d Shire stallion, Matchless, imported from Lincolnshire, England. Is a beautiful type of the Shire horse and comes of a popular family of prize winners. Sired by that noted horse Thumper and he by Waxwork. Matchless has won a number of first prizes.

Richard Delbridge, Winchelsea postoffice, breeder of purebred Berkshire hogs and white Leghorn poultry.

Septimus Hogarth, proprietor Elmdale farm, Exeter postoffice, has been a number of years engaged in breeding pure bred shorthorn Durham cattle from registered stock; also good grades; breeding good roadster horses from some of the best breeds, such as Clear Grit, Blackhawk and Hambletonian strains of blood.

James Loadman, Exeter postoffice, farmer, importer and breeder of heavy draft horses. Has first-class brood mares and raises good stock that he has sold at good prices.

John Doig, Jr., Kippen postoffice, breeds heavy draft horses and owns two good Clydesdale stallions imported by himself. Royal Topsman (3,981, vol. 7); Young Bonnie Scotland (3,606, vol. 6); also breeding good grade cattle, Leicester and Shrop; hire sheep and Berkshire swine.

John Willis, Exeter, horseman, of the firm of Colquhoun, Dow & Willis.

Leonard Hunter, Exeter postoffice, is a prominent and well-known stock grower, breeds pure bred registered shorthorn Durham cattle, carriage and roadster horses of a good class, Southdown and Shropshire sheep and Berkshire swine.

John Delbridge, Winchelsea postoffice, farmer and breeder of pure bred Durham cattle, bred direct from imported stock of the best milking families; also good grades.

Thos. Bissett, Exeter, has long been engaged in dealing in and breeding good horses; is the owner of the well-bred trotting stallion, Volo, a beautiful dark bay, stands sixteen hands high, black points, sired by John E. Rysdyk, he by Wood's Knickerbocker, and he by Rysdyk's Hambletonian. Volo's dam was Lucy Kennett, by Kennett (thoroughbred), sire of Barlow, who trotted a trial in 2:19 and was sold for \$12,000; also the sire of Nettie, the greatest province-bred racing mare in Canada in his day. In Volo are confined many of the excellent qualities of his illustrious ancestors, and with proper handling should distinguish himself as a trotter. This horse is certainly deserving the patronage of parties wanting to breed trotters or roadsters.

Charles Wolf, Crediton postoffice, farmer and breeder of heavy draft horses, owns an interest in two imported Clydesdale stallions, Boyston Boy 2d (2,633, vol. 7), and Heathen, sire Young Lord Lyon (994).

William Becker, Blake postoffice, proprietor Berne Hotel and owner of the celebrated standard bred trotting stallion, Fulton (record 2:30), sired by Old Temp-est, and he by Old Royal George, dam not traced, but she was the dam of Fred Hooper (record 2:23). Fulton is well-known as a trotter and sire of trotters.

George Taylor, Kippen postoffice, breeding heavy draft horses from mares that are nearly pure bred Clydesdales and imported horses, owner of a fine highly bred Clydesdale stallion, Gold Cup, foaled in May, 1885, sired by imported Stramer (2,441), dam Pay When Ready, by imported Welcome.

Francis Coleman, Hills Green postoffice, importer and breeder of English Shire horses. Mr. Coleman is one of the most prominent and reliable breeders of this class of horses in the country. He keeps on hand a number of first-class horses, all of which are either imported or bred by himself from imported stock and all registered in the Canadian Shire Stud Book. He issues a catalogue that will be sent free on application to intending purchasers.

Thomas Coleman, Hills Green postoffice, horse dealer and owner of imported Shire stallion, Prince Victor, foaled May 10, 1881, bred by Henry Freshney, South England, sire Rival (2,885), dam Flower (vol. 3, E. S. B.), by Farmers' Friend (798). This horse has taken a number of prizes, and his colts have taken first and second prizes wherever shown. Prince Victor is registered in C. S. S. B.

John Cochran, Hills Green postoffice, breeder of pure bred Clydesdale horses, owner of imported registered Clydesdale mare; also breeds pure bred Ayrshire cattle.

D. McIntosh, veterinary surgeon, Brucefield, graduated from the Toronto Veterinary College in 1872, and after spending a year at Kincardine located at Brucefield. Has been successful in the practice of his profession and now enjoys a lucrative practice and the confidence of the community generally. Has been quite extensively engaged in importing Clydesdales. Is a thorough judge of horses and frequently acts in the capacity of judge of horses at the large exhibitions at Toronto and other places.

David Reith, Hensall postoffice, importer and breeder of heavy draft horses. In 1882 imported two very fine pure bred Clydesdale stallions, and is now owner of Lord Buchan (No. 2,956, vol. 6), sire Earl of Buchan (1,126), dam Bessie Lee (770).

Wm. Reith, Sr., Hensall postoffice, farms and breeds pure bred shorthorn Durhams. This herd are of the Bates strain of good milking families and bred direct from imported stock and all registered in the D. H. B.; also breeds heavy horses.

James Cochran, Hills Green postoffice, breeder of pure bred Clydesdale horses from mares imported by himself and registered in vol. 5, C. S. B. Has a very promising young stallion called Speculation out of one of his imported mares and sired by imported Good Cheer (1,678, vol. 4).

H. Hoppel, Zurich postoffice, farmer, proprietor of flax mill and breeder of shorthorn Durham cattle from registered stock of the best class. Is also a large exporter of cattle and sheep.

Samuel Ramin, Esq., Zurich postoffice, farmer and owner of saw and shingle mill, breeder of shorthorn cattle from best registered stock; also Shropshire Down sheep and Berkshire swine.

Thompson Murdoch, Hensall postoffice, proprietor of a first-class livery and sale stable at Hensall and breeder of trotting and road horses. Owner of the famous standard (by performance) trotting stallion, Joe Gales, formerly West Liberty (record 2:28) under which name he is registered in Wallace's Stud Book. Joe Gales was bred by J. L. Wilson, of West Liberty, Iowa, sired by Wapsie (688), the sire of General Grant (2:21), and Glenwood (2:27), dam not traced. Wapsie was sired by General Bashaw, the sire of Josephus (2:19), and a number of others that trotted better than 2:30.

Samuel Smillie, Hensall postoffice, importer and breeder of Clydesdales; imported and owns Lady Cornwall, registered. Has a young stallion, Top Notch, bred from imported stock and registered in Canadian C. S. B. Sire Public Opinion, dam Lady Cornwall.

Wm. B. McLean, Hensall postoffice, agent for agricultural implements and breeder of well-bred roadster horses. Owner of a very fine young stallion by old Clear Grit, dam by Sir Arthur, and he by Whisker (thoroughbred); also has two colts out of same mare, got by Fulton.

Simon McKenzie, Brucefield postoffice, breeder of heavy draft and general purpose horses. Owner of the imported Clydesdale stallion, Kenilworth (2,187), sired by Sir William (2,119), dam Maggie 3d (1,660). Kenilworth is a dark brown, with three white pasterns and white stripe on face; weight, 2,100.

Robert McMordie, Kippen postoffice, importer and breeder of Clydesdale horses, breeding from stock imported by himself; mare Nannie (vol. 2), stallion, Scottish Chief, both registered in Select Clydesdale Stud Book. Scottish Chief foaled in Aug., 1883 (No. 152, vol. 2), sire Danley (222, vol. 1), dam Maggie, by Ivanhoe.

George Plavis, Brucefield postoffice, importer, exporter and breeder of Suffolk and Chester white hogs. Makes a specialty of these breeds and has been very successful.

Robert McGowan, Kippen postoffice, importer of Clydesdale horses and Shetland ponies, breeding from two very fine imported mares, Lass o' Bute (vol. 9), sire Blue Ribbon (1,961, vol. 5), dam Edinburg (vol. 9), and Keepsake in vol. 7, sire Knight of Snowdon (2,212, vol. 5), dam Jane 3d (859, vol. 4). Keepsake took first prize at Western Fair, London, in 1886.

Thomas Russell, of Riverside Farm, Exeter postoffice, has for a number of years been extensively engaged in importing and breeding shorthorn cattle and Clydesdale horses. Keeps on hand a number of pure bred Durham cattle imported by himself; also a number bred by himself from imported stock, all of which are among the very best stock in Canada, and all registered in the D. S. H. B. Has been a very successful prize winner, having taken the herd prize wherever he has shown. His famous stock bull, Mariner, was bred by Mr. S. Campbell, of Aberdeenshire, Scotland. His celebrated imported cow, Bracelet 2d, has taken many first prizes in this country, and none lower than second. She was one of the family prize group at the Northern show at Aberdeen in 1883. Breeds pure bred Southdown sheep and Berkshire swine.

Messrs. Colquhoun & Dow, Exeter postoffice, importers and dealers in Clydesdale horses; in August, 1887, imported from Aberdeenshire, Scotland, two very fine horses, Charming Charlie (1,917, vol. 9), sired by Royal Charlie (727, vol. 1), dam Gipsy, of Auchraod (2,103, vol. 6). Charming Charlie was foaled May 11, 1883. The other horse is called The Turk, and will be found in vol. 10. Also owners of the imported Clydesdale stallion, Young Rover (2,534), sire Strathclyde (1,538, vol. 3), dam Jess (1,532, vol. 5), and are interested with John Willis, of Exeter, in Young Lothair, imported and registered in Canadian Stud Book, No. 20, vol. 1, by the famous horse Danley (2,221), dam Kate, imported (No. 27, vol. 1). Freedom imported. Freedom won a number of prizes before leaving Scotland and a number since his arrival in this country, and his stock is turning out well and being sold at high prices. Their horse Douglas was bred in Canada from imported stock and registered in Canadian C. S. B.

Tipling Bros., proprietors of Palm Grove Farm, one-half mile east of Wingham, are breeders of Clydesdale horses and own the following animals: Garnet (imported, No. 2,795, vol. 3), a beautiful dapple brown, finely proportioned, easy action and a sure foal-getter; King of Quality, a dark brown, medium and black, has an enviable reputation as a good stock-getter. He has taken several prizes and a diploma. Their brood mare

Joseph Copp, proprietor of the City Paint Shop, Clinton, Ont., importer and breeder of standard bred horses. He has been breeding some fine stock, his first brood mare being a Royal George, from which he raised the well-known Royal George, Jr., trial record 2:25½. Biddy Donovan, a fine Kentucky bred mare, sired by Honest Allen, son of Ethan Allen, dam Agnes Donovan, by Lexington, is the last importation, and is one of the best in Huron county.

Thomas Tipling, the leading horseshoer of Clinton and exporter and dealer in horses. Mr. Tipling has built up a large business in exporting heavy draft horses, and being a good judge of a horse, parties will do well to call or address him when in want of anything in his line, or if they have stock for sale.

T. Dunlop, Livery and Saddle Stable, in rear of Bel Chamber House, Telephone Connection. Wedding and Funeral outfits. Christina Street, Sarnia.

Messrs. E. Gannt & Sons are proprietors of the picturesque farm, Willowdale, three and one-half miles southeast of Lucknow. This firm are the champion breeders of shorthorned cattle and Leicester sheep in this section. At present they have nine females and two males, registered in D. H. B., the head of their herd being the celebrated Lord Lovell, which took second prize at the Western Fair, London, in 1887. He is sired by Brampton Hero (324), dam Matchless of Elmhurst 2d. They also own a promising bull bred by themselves, sire Prince of Willowdale; dam Lady Harper 2d. Among their females are: Miss Booth, sire Prince of Seaburn, dam Agnes Buckingham, by Liberator, and contains the Cruikshank strain. Vacuna 6th, sired by Baron Stanley (25,644), dam Vacuna 21, is of the Fashion family. Besides these are many others of the same strains shown above. This firm have been breeding Leicester sheep for the past twenty years, the last five of which they have been showing at the Provincial and other large fairs, where they have been very successful prize winners. This firm well deserve the name of model farmers. There is a business and courteous manner about each member which is commendable. Inspection solicited. Postoffice, St. Helen's, Ont.

Thomas Agnew, Wingham, Ont., is proprietor of a first-class livery stable in the business part of the town. He usually has about thirteen horses and always a good supply of A 1 conveyances. For many years he was a breeder of thoroughbred horses, and at one time owned Honest John, alias Real McKay. He owns a handsome team of chestnuts of the roadster class, one sired by Moonstone, the other by Gold Dust. Dams of both were coach mares. This team has taken thirteen first prizes, being the highest record of any team in the county. He also owns a team of carriage horses (dark bays), one sired by Whalebone from a Royal George mare. Any person doing business with Mr. Agnew will find him courteous at all times.

Robert Martin, Clinton, Ont., breeder of registered Clydesdale horses and owns one of the best lot of this breed in the county. His stallion, Galan's Model (3,616), is a choice animal and a great stock getter, while his imported mare, Kilkeman Nell (vol. 7), is at the head of her class. She has raised a filly, which for her age has carried off more prizes than any other of her class in this section. Mr. Martin also owns numerous other good Clyde horses and is said to be one of the best breeders in this part of Ontario.

Geo. Swarts, proprietor of the well-known and popular Hotel Prince of Wales, Clinton, Ont. Mr. Swarts is a hotel man of large experience, and his guests are loud in their praise of the fare of this well-kept house.

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H. G. Hibbs, farmer and breeder, Clinton, Ont., owner of the celebrated Shire stallion, Lincolnshire Tom, a fine black in color and stands sixteen and one-half hands high, with mane four feet long, sired by Old Lincolnshire Tom (No. 1,367). This is one of the largest Shire horse in the county and has left some very choice stock.

Diamond, has raised two very fine colts, one from Garnet, foaled in 1885, the other from King of Quality, foaled in 1886. This firm also own a trotting mare, sired by Blackhawk Morgan, from which they have bred colts by such noted sires as Tom Campbell, Doctor Butler and Tontine. The Tipling Bros. are young and enterprising, and as they are making a specialty of Clydesdales no doubt will keep to the front. Postoffice address, Wingham, Ont.

S. G. Switzer, farmer, Bayfield, Ont., owner of the imported stallion, Cashley Prince, one of the best Clydesdale horses in this portion of Ontario (registered in vol. 6), sired by Baron of Buckleyville (1,578, vol. 6), dam Jean (vol. 6, C. S. B.). Mr. Switzer also has some fine young stock, sired by this horse, which are a credit to the sire.

Wm. Roche is owner of Maple Hill Farm, consisting of 200 acres, situated six miles west of Wingham. The buildings are commodious and conveniently arranged. Mr. Roche owns the imported Clydesdale stallion, Gold (1,578), which took two first prizes before he was imported and a first prize and diploma the only time shown in this country. Gold is blocky and finely proportioned, has an abundance of vitality with free and easy action. He was highly commended at the Highland Society's show at Edinburgh, Scotland. All communications sent to Mr. R. at Marnoch postoffice, Ont., will receive prompt attention.

Thomas Taylor, proprietor of Fairview Farm, consisting of 100 acres, ten miles west of Wingham and nine miles south of Lucknow, owns two Clydesdale stallions. Huron Chief (imported, registered in S. S. B.) is a bright dapple bay of medium weight and has left some of the best stock to be found in this section of the country. Mr. Taylor has raised stock, sired by Huron Chief, that has brought high prices. Scottish Knight (imported, registered in S. S. B.) is a bright bay with white hind feet. While not of the heaviest class, he is blocky and has won a prize wherever shown. Mr. Taylor is breeding cattle which he is improving by using thoroughbred shorthorn bulls. All communications sent to St. Helen's concerning stock will receive prompt attention.

Messrs. Rutherford & Son are proprietors of Springbrook Stock Farm, consisting of 200 acres, four miles south of Lucknow. The farm has several springs on it, giving an abundant supply of water the year round, thus making an excellent farm for stock raising. This firm are breeders of shorthorned cattle, among which are the following registered animals: Christina, sire Double Dee (464, D. H. B.), dam Primrose; Eugenia, sire Double Dee, dam Jenny; Hiawatha, a red and white bull, sire Double Dee, dam Capitola. They have a bull calf from their choice cow, Christina, which promises to fully keep up the enviable reputation of the older stock. They have a number of high grades, many of them as good as thoroughbreds. This firm are breeding heavy draft horses, having a particularly fine mare, Queen, with three Clyde crosses, besides a number of fine young animals. Communications sent to Belfast postoffice will receive prompt attention.

Chas. J. Disney, Holmesville postoffice, Maitland concession, Goderich township, is a farmer and breeder of draft horses. He is the owner of some superior stock, and his well-kept farm and fine animals testify to his skill as a farmer and breeder.

Wm. Lasham, of Saltford, is proprietor of the Union Hotel at this place. Mr. Lasham is very popular landlord, and guests always find their wants well supplied at his hotel.

Wm. Doherty, of the firm of W. Doherty & Co., organ manufacturers, Clinton, is one of the leading business men of the place and a representative horseman. He is the owner of some fine horses, among them the imported standard bred stallion, Al Sillip (4,027, Wallace's Register). His name has since been changed to Pilot Mambrino, sired by Melbourne King (1,962), he by Mambrino King (1,227), he by Mambrino Chief, by Mambrino Paymaster, dam Lizzie Jackson 2d, dam Helen McGregor. This horse contains the best strains of blood of the American trotting families.

John Middleton is one of the largest farmers in Huron county, and a breeder of shorthorn cattle. He has a fine herd at present, containing such stock as Fancy Garland, Robinson's Garland, Queen of May (144) and many others. He has recently added to his herd a fine bull from the celebrated herd of H. Y. Athrell, of Goderich. Mr. Middleton is one of the representative men of Goderich, and also owns an extensive farm in Manitoba.

Daniel Shanahan, Clinton postoffice, is proprietor of Karney Grove Grain and Stock Farm, comprising 250 acres, one and one-half miles from Clinton. He is the largest grower of small grain in his township, and for many years has been buying and selling stock, usually keeping from fifty to sixty head on hand. His fine barn, 50x95, is well arranged for stock purposes, water running into each manger. Mr. Shanahan's shorthorn bull was sired by Duke, one of the prize winners of Huron county. Besides the home farm, Mr. Shanahan owns several others, and in all his business enterprises has been very successful.

James McFarlane is owner of the Maple Grove Stock Farm, comprising 250 acres and nicely situated on the Bayfield river, near Clinton. He is the leading breeder of Polled Angus cattle in Huron county, having imported a choice lot of his herd direct from Scotland. His imported bull is called Butterworth. Mr. McFarlane also breeds pure Shropshire sheep and is an importer and breeder of pure Clydesdale horses.

R. J. Jenkins is proprietor of the Rolling Hill Stock Farm, two miles north of Clinton. He is a breeder of shorthorn cattle and usually keeps about thirty head, of which ten are pure bred and all are creditable. He also breeds a good class of road horses and owns two fine Mexican brood mares. He also has a small herd of very fine Leicester sheep.

X. Beecher is owner of Falls Reserve Stock Farm four miles east of Goderich. This is one of the largest stock and general farms in the county, comprising 1,100 acres. The Maitland river flows through the place, on the banks of which is found the best of limestone. Mr. Beecher manufactures lime in the largest kilns in this section. He also owns a saw mill and cuts large quantities of lumber from timber cut on his own land. He has one of the largest barns in the county and has built for himself a fine bridge costing \$5,000, which will compare with any public structure costing twice as much. Mr. Beecher is one of the enterprising men of the county, and expects to make of his place the best breeding farm in this section.

Eli Bateman, Holmesville postoffice, Goderich township, seventh concession, is a farmer and also an exporter of and dealer in horses. Mr. Bateman's skill and experience enable him to make good selections, and his large business as an exporter is continually growing, his good stock always opening up new markets for him.

W. J. Biggins, of Clinton, owner of Elmhurst Stock Farm, is the leading breeder of shorthorn cattle in this part of Ontario. His stock is very choice and brings good prices. His imported bull, Excelsior (51,233), is the largest of his breed in Huron county. He has two fine cows, Matchless (page 627, vol. 3, C. H. B.), and Matchless of Elmhurst (60). Mr. Biggins stands very high as a breeder.

James Laithwaite, Clinton postoffice, Maitland concession, Goderich township, is a farmer and breeder of draft horses, and his stables contain many fine animals. In addition Mr. Laithwaite is a breeder of registered shorthorn cattle, of which he has a very fine herd.

John Knox, of Goderich, is a deputy sheriff and proprietor of an excellent livery stable in Goderich. Mr. Knox is not only a very clever detective, but can handle the ribbons in a race like an artist, and has driven many a fast horse to a well-earned victory.

WATERLOO COUNTY.

T. K. Smith is an importer and breeder of Cleveland Bays. He has two stallions, Prince Arthur and Barnaby, and three mares selected from the best stock at Cleveland, England. They are said to be the best lot of Cleveland Bays in this section. Mr. Smith is a practical farmer, but will make breeding and importing a specialty, and will be prepared to furnish anything in his line. He is six miles south of New Hamburg.

Sebastian Weis, of New Hamburg, is an importer of Norman and French draft horses and French coach horses. In 1885 he imported Prince Napoleon (85) and Louis Napoleon (86). In 1887 he went to France and brought back three Norman stallions and three French coach stallions, one having a record of 2:33 at three years. Mr. Weis is an experienced breeder, and as his selections were made from a large number, his experience secured him good animals. Persons desiring choice animals would do well to call on him.

A. C. Hallman & Co., New Dundee, are importers and breeders of thoroughbred Holstein-Friesian cattle. They have one of the largest, best selected and most uniform herds in Canada, with Prairie Aggie Prince (vol. 1, No. 2, H. F. H. B.) at the head. This animal has been a great prize winner. His sire was Royal Aggie (H. H. B., No. 3,463), grand sire De Ritter (No. 88, N. H. B.). His dam was Prairie Flower (H. H. B., vol. 4, No. 962; Advanced Registry, vol. 1, No. 17), with a butter record as a five year old of twenty pounds one ounce unsalted butter per week. Her grand dam (N. H. B., 2,327), gave fifty-two pounds of milk as a two year old. All stock is selected with care and best of pedigrees. Their motto is "Quality." Their shipping station is Petersburg on the G. T. R.

Alex. Peterson, Hawksville postoffice, proprietor of Pleasant Valley stock farm and one of the well-known and reliable breeders of pure bred, registered shorthorn cattle, heavy draft horses and Berkshire swine. Cattle are of the Crichtonshank strain and good milkers. A few of his cows deserving special mention are Lady Laura and Lady Iva, both by Earl of Shrewsbury 2d, out of Duchess of Kent and Psyche by Baron Rowton, dam Lady Clifton. Mr. Peterson is extensively engaged in buying and exporting horses of all classes; is a member of the "Clydesdale and Coach Horse Co.," of Waterloo, the owners of the celebrated imported Clydesdale stallion Boydston Boy (111). When Boydston Boy was imported, in 1881, he was said to be one of the five best bred horses then living. He is also the owner of a number of well bred Clydesdale mares, among them Queen of the Valley, registered in C. C. S. B., No. A 76, that has a promising horse colt by Boydston Boy, foaled in 1887.

Peter Ifter, manager of the House of Industry and Refuge of the county of Waterloo, is breeding Jersey cattle on the 140 acre farm in connection with the institution, having at present eight head. The head of the herd is Young Canada John Bull, of the finest strain of blood, and has won first prize wherever shown. Mr. Ifter buys and sells a great number of horses and makes a specialty of matching teams. He at present has a fine draft team and a carriage team, the latter being the best he ever handled, making twelve miles an hour at their natural gait. Mr. Ifter is a thorough business man, and though his charge is great, he is well fitted for the position. Address Berlin.

Isaac B. Clemens, of Fairview Farm, two miles north-east of Preston, is a breeder of shorthorns, having at present thirteen females and five males—Maid of Fairview, got by Duke of Woodhill, dam Grace, she by Howard (354), dam Josephine by Nichol (494). His stock bull, Earl of Oxford, is got by Earl of Antrim 6th, dam Oxford Queen by Constance 2d. Mr. C. is uniting these two strains. He also owns a share in the trotting stallion Fred Lambert, got by Black Lambert (2,27), by Daniel Lambert, sire of thirty horses in 2:30 list.

J. B. Hagey, proprietor of Riverside Farm, three miles north of Preston, is a breeder of short horns, having at present eight females, among which are the following: Duchess of Waterloo 2d, got by Duke River Bank (6,993), dam Duchess of Waterloo; Duchess of Waterloo 4th, got by Woolwich Duke (9,537). All the rest are of the strains here represented and are a credit to their owner. Young stock for sale.

J. B. Bengeman, of Cedar Spring Farm, consisting of 200 acres, is a breeder of shorthorns. The matron of the herd is Melody 5th, got by Royal Prince (9,313), dam Melody by Pilot; Bloomingdale Rose, got by Red Prince, dam Melody 5th, is another fine female. Mr. Bengeman also breeds carriage and Clyde horses, using the most popular sires. He intends making a specialty of these two lines. Young stock for sale. All inquiries sent to Bloomingdale postoffice will receive prompt attention.

John Brydon, the popular horseman, is proprietor of the Clyde stallion Senlar (No. 4,010, vol. 7, C. S. B.), sire General Williams (327, vol. 1), dam Maggie (3,972, vol. VII.), tracing back on both dam's and sire's side to the Glancers. This stallion is a light brown, medium and blocky, free action, and is a sure foot getter. He is considered to be the best bred stallion in Western Ontario. Mr. B. also owns the French Canadian stallion Emperor of France, sire Sir Francis, he by Old Emperor in France, dam of the River du Loup breed. This stallion stands sixteen hands and weighs 1,650 pounds. He has great bone and muscle, heavy mane and tail. Mr. B.'s postoffice is Roseville.

James Brown is owner of the beautifully situated Brownsville Stock Farm, consisting of 300 acres, six miles southwest of Galt. A spring near stock buildings never goes dry. The buildings are commodious and conveniently arranged. Mr. B. is one of the most prominent breeders of shorthorns in this section. He has eight cows registered in the D. H. B. His present stock bull, Waterloo, Duke 14th, was bred at Bow Park. He has four promising bull calves, besides a number of young females, all of the best strains of blood. Any person wishing to purchase would do well to give him a call. As Mr. B. wishes to retire from business, his farm is for sale. Postoffice address Galt.

James Chandler, Ayr postoffice, is proprietor of the imported Clyde stallion Custodian (No. 4,849, vol. 9, S. S. B.). This stallion is dapple brown with four white legs, weighs 1,900 pounds, has excellent style and action, heavy muscle and perfect limbs. He won first

Industry and breeding Jersey on with the in- The head of the finest strain ever shown. Mr. of horses and H. a present the latter be- twelve miles an thorough busi- cut, he is well

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prize at Galt, Ayr and Drumbo and second at Hamilton in 1887, when five years old; is a sure foot-getter and is very popular where he has traveled.

Geo. Edgar, of Ravenhill Farm, two miles northeast of Ayr, is an extensive breeder of shorthorn cattle, having usually about thirty head. His present stock bull, Lord Stanley (No. 685, D. H. B.), sire Earl of Goodness 5th, dam Lady Stanley, is a credit to its owner. Among his females are: Beauty of the Valley, got by Constance's Duke, dam Beauty Roan (imp.); Maid of Honor, got by Balco, dam Fauny by Howard. His stock all traces to the Beauty tribe and are all registered in D. H. B. Mr. Edgar sold four young bulls in the spring of 1887, and has sent animals, purchased by mail, to different parts of Ontario, to Illinois, Nevada and the Northwest Territory, which not only shows the popularity of his stock, but the confidence the public have in Mr. E's judgment and fair dealing. Postoffice address Ayr.

Andrew Kersell, proprietor of Hidden Resort Farm, consisting of 200 acres, four miles north of Ayr, is a breeder of shorthorn cattle and Clyde saddle horses. Among his herd of shorthorns are: Lady Lawson (13.-704), got by Lord Stanley, dam Margold; Jennie, sire Duke of Bedford, dam Fabura by Constance's Duke; a heifer got by Lord Stanley, dam Jennie. These all belong to the Beauty tribe. Mr. K. owns a fine Clyde brood mare, which raised a foal to Lord Hadder, and is now in foal to Custodian (imp.). If a good beginning insures success, Mr. K. will come to the front. Post-office address Galt.

John D. Moore, of Florence, grain farm, consisting of 400 acres, five miles west of Galt, is the largest breeder of Merino sheep in Western Ontario, having at present 150 breeding ewes with lambs and rams, making a flock of 340, which he purposes increasing to 500. They are of the Spanish variety, originally coming from Vermont. Mr. Moore owns a handsome driver, Billy B., sire Chicago Volunteer, dam a trotting mare. Billy B. is a great prize winner and has the reputation of being the best driving horse in Western Ontario. Mr. M's buildings are very large and conveniently arranged. Postoffice address Galt.

T. & A. B. Snider, importers and breeders of Percheron horses, with the following choice collection: Grey Hawk (815, P. S. B. of France and 689, vol. 1, U. S. P. N. S. B.), got by Favori 1st (71), dam Juliette by Vieux Chaslin (713); Cezar (No. 856, 757), sired by Decidee; Bordine (754, 998, vol. 1, P. S. B. of France, vol. 2, P. S. B. U. S.), sired by Superior, dam Vieux Chaslin; Metacomet (1,224, P. S. B. France and 2,366, P. N. S. B. of U. S. A., vol. 3). Also the Kentucky bred coach stallion, Smuggler. They are also breeders of shorthorn cattle and have a number of fine ones. Post-office, German Mills, Waterloo county, Ont.

F. Lowell & Son, West Montrose postoffice, proprietors of West Montrose Breeding Farm and breeders of thoroughbred horses, registered shorthorn Durham cattle, Southdown sheep and Berkshire swine. Cattle are of the Bates and Booth strains, bred direct from imported stock, and all registered in D. H. B. with the famous Bow Park bull, Waterloo Duke 12th, at the head of the herd. Among this splendid herd are a number of large, massive, healthy cows and fine young males and females that deserve the attention of intending purchasers.

James F. Hammond, Wellesley postoffice, breeder of registered shorthorn cattle, heavy draft horses and pure bred Berkshire swine.

Wm. McEachlan, of Waterloo, has a well equipped livery, sale and boarding stable. Commercial men can always find suitable conveyances and good drivers.

George Burnett, Winterbourne postoffice, has been a number of years engaged in breeding registered shorthorn cattle, and at all times keeps on hand young stock for sale.

Isaac Devitt, Floradale postoffice, general farmer and breeder of heavy draft horses; owns pure bred Clydesdale mare, Nellie of Guelph (No. 84), by imported Ontario Chief, dam by imported England's Gloiy, and a filly by imported Clyde Roy that is eligible for registration. Has a number of highly bred mares from which he is raising good young stock by such popular imported sires as Roydston Boy, Bay Count, etc.

John Reidel, Hawksville postoffice, and Alex. Steser, Garton postoffice, are breeders of Clydesdale horses and dealers in imported and Canadian bred Clydesdale stallions and owners of Scotch Wharfe (No. 275, vol. 1), bred from imported registered sire and dam; The Banker, by imported Lord Derby, dam by imported Annandale, and the Canadian bred stallion, Indian Chief (104, vol. 1, C. C. S. B.), sired by imported Ontario Chief (1,398,) dam May (No. 83), by imported Wellington.

Campbell Bros. of Mountain Stock Farm, Crosshill postoffice, are prominent and extensive breeders of general purpose horses and pure bred shorthorn cattle, Leicester sheep and Berkshire swine. Cattle are bred from imported stock and registered in D. H. B. They have a fine breed of choice cattle; keep on hand for sale a number of thoroughbreds and good grades; own imported stock bull, bred by E. Cruickshank, of Scotland.

Messrs. A. B. & A. W. Robertson, Nithburg postoffice, dealers in Clydesdale horses and breeders of heavy horses and pure bred shorthorn registered cattle, and owners of the following imported Clydesdale stallions: Danley Chief, sired by Danley (222, vol. 1, dam Besie, by Ivanhoe (306); and Earl of Hopetown (No. 2,088), sired by Baron Lawers (1,055, vol. 2), dam Arkley's Mare (972, vol. 5). These horses are descendants of the most popular families of Clydesdales in Scotland.

John Koch, New Hamburg, Ont., proprietor of Royal Exchange Hotel and owner of the Norman-Percheron stallion, Young Greyhawk, sired by Greyhawk of German Mills, dam by King of France. Mr. Koch is among the prominent horsemen of the place.

Robert Weikleham, New Hamburg, is an importer and exporter and dealer in Clydesdale horses. In 1886 imported the two young stallions, Belstan Boy (4,844, vol. 9, 394, C. C. S. B.), and Middleton Laddie 2d (No. 5,218, vol. 9, 385, C. C. S. B.) Both the above are good horses, the latter having superior bone, good muscle and action.

Stiefelmeyer Bros., New Hamburg, Ont., are proprietors of a livery, sale and boarding stable, where they keep a number of good drivers; owners of the roadster stallion, Solid Gold, sired by Young British Champion, he by imported British Champion, dam a Rock mare by Dr. Butler, imported from Kentucky. Also the promising young trotting stallion, Pilot, sired by that famous horse Old Clear Grit, dam Black Warrior, by Royal George. In Pilot are combined the blood of the two most celebrated families of trotters in Canada.

Jacob S. Meyer, St. Clements postoffice, breeder of heavy draft horses, pure bred and high grade shorthorn cattle; owner of imported Clydesdale stallion, McCartney (No. 3,816, vol. 7), and a Canadian bred stallion, Young Count, sired by imported Count.

BRANT COUNTY.

Glennie Bros., proprietors of Glenwood Farm, are breeders of Hereford cattle, Berkshire pigs and roadsters. Their bull, Premier, sire Dairyman (102), dam Likeness 3rd (imp.), was bred by C. C. Bridges, of Simcoe, and is a fine animal. Their original stock of Berkshires came from Bow Park. Among their brood mares are Dolly Varden, by Royal Revenge, in foal to Dillard Wilkes; Lady Elgin, by Baron Rothschild, in foal to Pericles; Lucy Gray, by Royal George, in foal to Amber, Jr., and three other mares in foal to Bay Comet. Postoffice address, Scotland, Ont.

Wm. Thompson, of Maple Grove Farm, seven miles south of Brantford, is a breeder of Shropshire sheep, having at present eighteen breeding ewes, three stock rams and nine lambs, but he has sold forty-five head this fall in Ontario and the United States. Six ewes and one ram, imported by John Dryden, formed the foundation of his stock; 140 prizes have been taken the last three falls by his sheep. The average weight of six show ewes was 250 pounds. He also has about fifty hogs, part pure Berkshires and part crosses between Berkshires and Poland-China hogs. His stallion, Sir James, Jr., by Old Sir James, dam from Royal George is a fine animal. Address, Mohawk, Ont.

John Wright & Son, six miles east of Burford, are breeders of Leicester sheep. Their present stock ram was got by a ram imported by Mr. W. in 1882, he having brought out two ewes at the same time. His flock now consists of twenty-five breeding ewes and forty lambs. His ram has won thirty-one first prizes and his ewes and lambs have been equally successful in the show ring. They also breed agricultural horses and high grade Durham cattle for the market. Address all communications to Mohawk, Ont.

Andrew Telfer, proprietor of Springfield Farm, two miles northeast of Paris, is one of the most prominent breeders of Southdown sheep in this section of Ontario, having been successfully engaged in the business for thirty years and is in great demand as a judge at the fairs. His present stock consists of a pair of imported ewes and the balance from imported stock from Mr. Jackson of Abingdon, and Mr. Wilkinson of Gleanford. His stock ram is sired by Beau Brummel. Mr. Telfer enters largely into the dairy business in connection with his sheep husbandry. Postoffice address, Paris, Ont.

W. N. Ames, of View Villa Farm, four miles northwest of Paris, is a breeder of carriage horses and owner of the stallion, Young Volunteer, sire Chicago Volunteer, dam (owned by Mr. Ames) by Buckland's Imported Champion. He also owns a full sister to Young Volunteer's dam. These mares were never beaten in the show ring. He also owns another brood mare and a number of promising colts got by such noted sires as Royal George and Hambletonian stallion, Larcher. Young Volunteer and the others are in the market. Address, Paris postoffice, Ont.

The House of the Manor Farm, three miles west of Paris, though highly favored by nature, has been much improved by the art and refined taste of its proprietor, John Conworth, Esq., the first importer of Shropshire sheep in Ontario. His first importation consisted of ten ewes and four rams bred by the Earl of Strathmore and got by the famous Bedford Hero. In 1880 he imported eight more. His present flock consists of seventy-five ewes, twenty-seven ewe lambs, besides his stock ram and four ram lambs. This ram was bred by Mr. Campbell, of Woodville, sire Lord P. (1,798), he by The Patriot (1,198). Patriot served in 1881 fifty ewes at 100 guineas and the following year fifty ewes at 200 guineas. Mr. Conworth has been popular as a judge at

the local and provincial fairs for a great number of years, and has been urgently requested to make importations for men who did not wish to trust to their own judgment. He has sent sheep to Virginia, Iowa, Michigan, Nova Scotia and Manitoba. He also owns two nice Jersey cows, one imported by Mr. Beattie, the other bred by Mr. Smoke, of Canning, Ont. Communication sent to Paris postoffice will receive prompt attention.

Messrs. O'Brien & Colwell, two miles northwest of Paris station, are extensive breeders of the following varieties of fowl: Partridge, buff and white Cochins; light and dark Brahmas; brown and white Leghorns; black and silver spangled Hamburgs; gold, silver and white crested Polands; Houdans, Doreans, Plymouth Rocks, Langshaws, Wyandots and black Spanish; black, red, duck wing and Pile games, and the same varieties in Bantams; bronze turkeys, China, African, Bremen, Toulouse, and Embden geese; Rouen and Pekin ducks; 110 prizes taken in 1887. They also breed Chester white hogs of the best strains of blood and have been successful prize winners in this branch for the past fifteen years. Correspondence solicited. Postoffice address, Paris station.

Hugh Wight & Son, proprietors of Maple Height Farm, four and one-half miles south of Paris, are breeders of Cotswold sheep. Their present ram is a direct descendant from an importation of Mr. Gage, of Simcoe, and their ewes from that of the late James Miller, of Paris. They took first prizes at all the local fairs in 1887, except at Brantford and Simcoe, where second prizes were taken. Twelve of their sheep yielded 197 pounds in one shearing. They also own a promising male colt, Freddie R., sired by Clear Grit, dam from Winfield Scott. A call solicited. Communications sent to Paris postoffice, Box 77, will be promptly attended to.

D. G. Hamner & Sons, of Hill Home Farm, four miles south of Paris and five miles west of Brantford, are among the most prominent breeders of Shropshire sheep in this part of the province. They have been engaged in this branch since 1882, their success being such that they cannot supply the demand. They purchased their original stock from the well-known importers, James Geuny, of Guelph, and Ross, of Jarvis. In 1887 they took flock prizes at Hamilton, Galt and Brantford. Visitors cordially welcomed. Postoffice, Mt. Vernon.

Alex. Kennedy, proprietor of Woodbine Farm, four miles south of Ayr, breeder of Holsteins; stock bull Tyrant (No. 4,017, vol. 8), sire Lion (No. 1,744), dam Musette (No. 3,213) is an excellent animal and winner of second prizes as a yearling at Toronto and London, and second at Hamilton in the aged class. The matron of the herd is Flora Jane (No. 10,447, vol. 9), bred by P. de Vries Wyde Wormer, Holland, imported by G. E. Brown & Co., Illinois, U. S. Her three year old milk record was sixty-two pounds per day. Mr. K. also owns Flora Jane 2d, sire Blair Athol (No. 4,624, H. H. B.), dam Flora Jane. Woodbine Prince, sire Tyrant, dam Flora Jane, is a promising calf. Mr. K. also breeds carriage and road horses for the market. Communications sent to Ayr, Ont., promptly answered.

Gilbert Merritt, of Oak Ridge Farm, five miles south of Burford, is a breeder of roadster and carriage horses. He owns the following brood mares: Lady Scott, by Combination, dam by Royal George; Silver Tail, by Fulton; also the well bred mare, Queen. Mr. M. has been using the celebrated stallions, Whistle Jacket and Amber, Jr., and has raised a number of very promising colts, among them being a young stallion foaled in 1884, got by Amber, Jr., dam Silver Tail. Mr. M.'s stock has the reputation of being the best roadsters in this section of the country. Intending purchasers

would do well to give him a call. For further particulars address him at Scotland postoffice, Ont.

W. M. Smith, of Fairfield Plains, four miles south of Barford, is a breeder of poultry, Merino sheep, Ayrshire cattle and Poland-China hogs. He is the most extensive breeder and exhibitor of all kinds of poultry in Ontario. His original stock of Ayrshires are from the well-known herds of Joseph Yull, of Carleton Place, and Thomas Gray, of Oshawa. He purchased his first stock of Poland-China hogs from Mr. Baldwin, of Colchester, whose reputation needs no comment here. He is an extensive breeder of Merino sheep, having been engaged in this branch for twenty-five years. He spares no pains to have his stock brought before the public, as may be seen by the great interest he takes in exhibiting at the different fairs throughout Ontario, where he has been a most successful prize winner. Postoffice address, Fairfield Plains.

Wm. Watson, proprietor of livery stables, near Windsor House, Paris. First-class roadsters and conveyances always on hand. Prompt attention to orders and satisfaction in outfit, his motto. Telephone communication to stable.

Henry Nellis, of Fish Pond Cottage Farm, three miles north of Paris, is breeder of Percheron horses and Poland-China hogs. His brood mare Nell, from a Messenger mare and a French horse, is in foal to the Percheron stallion French Lion; her stable companion is in foal to the coach horse Garibaldi. He has a number of young horses from noted sires for sale. Besides breeding pure Poland-China hogs, he is raising high grade cattle which he is improving by using thoroughbred bulls. Postoffice address, Paris.

Hillside Farm, two miles south of Paris, is the property of J. W. Reed, Esq., Toronto. A beautiful spring furnishes water in the stock buildings. The business manager, Mr. James Geddle, is enterprising and systematic. The present head of the herd of shorthorns is 7th Earl of Darlington bred at Bow Park, got by Duke of Clarence (33597); dam Darlington 28th (by Duke of Oxford 39th (33712); sire of Earl of Darlington cost \$11,000. He also has a herd of eight cows from the Roan Duchess family, of the Bates strain; and one cow of the Booth strain, tracing back to imported Lady Jane. In 1887 he sold thirty-two head at paying prices, and have always on hand a number of males and females for sale. Postoffice address, Paris, Ont.

Wm. Mitchell, proprietor of Sunnydale Farm, three miles east of Ayr, is breeder of Berkshire, Suffolk and Poland-China hogs, also roadster horses. Mr. Mitchell's hogs are all registered: are from the stocks of the best breeders in this line, and have been great prize winners. His brood mare Rover is from a high bred Messenger mare got by Shot Eclipse, sire Canada Southern. She has bred a promising colt to Dillard Wilkes, and is now in foal to the same horse. Young stock for sale. Postoffice, Glenmorris.

Robert Carriek, proprietor of Merryfield Grain Farm, four miles northwest of Paris, is breeder of shorthorned cattle, Berkshire pigs and Leicester sheep. His stock bull is got by Duke of Sharon 10th. Two of his cows are registered in vol 4, B. A. H. B. The remainder of his herd is got by Duke of Sharon and Duke of Bedford. He got his start in Leicester sheep, from the well-known pure stock of Mr. Andrew Teller. His stock boar is from the stock of the noted Trevelyan boar belonging to H. Sorby, and has been a great prize winner. He has a sow from the same strain of blood. He also breeds horses from such popular sires as Crown Imperial and British Flag. Mr. Carriek's farm is well known to be the best grain farm in Brant. Although this is saying a great deal, it can be substantiated by figures. As he

thinks of retiring, his farm is for sale. Postoffice address, Paris.

Thomas Scott, of Glenmorris, is breeder of Jersey cattle, of which he has two males and four females at present. Gipsy King sire, Actor of Hillhurst by Nero, he by Carlo, is as fine a bull as can be found in Western Ontario. His other male dropped in 1887, is sired by Golden Roter, dam Afternoon. Among his females are: Brown Gipsy, by Vails Champion; dam Brownie of Glenduart; Gipsy Beauty, sire Carlo of Glenduart, dam Brown Gipsy. Afternoon got by Eurioter, dam Zoe M. Lactea 2d, got by Garenne's Cicero, dam Lactea. These have all been served in 1887, to the best bulls to be found. Mr. Scott will spare no pains to keep an A 1 stock. Postoffice, Glenmorris.

Oak Knoll Farm, consisting of 130 acres, two and one-half miles north of Paris, well watered by a running spring, is the property of J. H. Patten, breeder of shorthorns and Poland-China hogs. His stock bull, Billy Patterson, registered in D. H. B., is a fine animal. Besides his shorthorn cow Dolly Varden, he has two Ayrshire cows, dam Maid of Avondale; she by Avondale Farmer (imported). He keeps a number of high grades and an average of sixteen feeders for market. His present Poland-China boar is from the stock of W. M. Smith, while the remainder of his hogs are from the old Brigham stock of Illinois. He has two mares of Foxhunter strain, that have raised foals to the imported coach horse Garibaldi, and to Chicago Volunteer. All communications sent to Paris will receive prompt attention.

Peter Marshall, proprietor of Springhill Farm, three miles from Ayr, is one of the oldest and most successful breeders of Leicester sheep in this section of Ontario. He has bred to none but imported rams for the past twenty-five years. He at present has twenty-four ewes, all descended from the noted stocks of Miss Stark and Lord Pollworth. Mr. Marshall has been popular as a judge at the different fairs for many years. Any persons purchasing from him, are sure of obtaining the purest and best strains of blood. Postoffice address, Ayr.

F. Irvin, of Mount Norris Farm, four miles north of Brantford, is breeder of shorthorned cattle, draft and roadster horses, Leicester sheep and Berkshire hogs. He has a number of shorthorns registered in D. H. B. from such popular sires as Grand Prince Hazelwood, Ivanhoe and Roan Duke. Most of his herd are of the Blanch family and are worthy of their strain. The ready sales Mr. Irvin has had testify to the quality of his stock. His brood mare Jesse got by Winfield Scott, from a mare; is a foal to the coach horse Garibaldi (imported). Jennie got by Manbrino Rattler; dam by Clear Grit, is a foal to Dillard Wilkes. A Messenger mare is in foal to Garibaldi. Mr. Irvin's sheep are descended from the stock of James Davidson, and have been bred to the best rams, while his hogs are from the importations of Snell of Edmonton. A call solicited. Postoffice, Brantford.

The farm of Snider & Edmondson, two and one half miles northeast of Brantford, are importers of Clydes, Cleveland Bays, Suffolk, Percheron and coach horses. In 1875 they imported Sir James Loch, Fergus and Justice; all turned out to be popular sires. In 1885 they imported the Cleveland Bay Venture, two coach horses, Yorkshirer and Prince George, and the Clyde Great Scott. In 1886 they brought out two Suffolk Punches, Hero and Prince of Wales; three Clydes, Athol, Bide Your Time and King William. They at present own Venture, Bide Your Time, Great Scott and Prince of Wales. Bide Your Time is medium and stocky, while Great Scott is larger and more rangy; both have

heavy muscles and free actions. Venture has great style and action, good muscle, and is a sure foal getter. Prince of Wales, foaled in 1885, is a very promising animal, and will weigh, when full grown, at least two thousand pounds. All their stock is in the market, and will be replenished by further information. Postoffice address, Brantford.

James Trotter, proprietor of Bashaw Farm, four miles north of Brantford, is breeder of Clydesdale horses and Leicester sheep. His mare Jean, sire Old King of France, is in foal to Marquis of Lorne, having raised two very fine colts from the same horse in past years. Jessie is a finely built mare with five Clyde crosses. Fan, sire Matchless, dam a blood mare, is in foal to the coach horse Garibaldi (imported). Mr. Trotter's sheep have been bred pure for the past thirty years, and are a credit to their owner. Inquiries concerning stock, sent to Brantford postoffice, will receive prompt attention.

Woodside Farm, consisting of sixty acres, one and one-half miles north of Brantford, tastefully decorated with evergreens, is the property of Peter Turnbull, who has started the breeding of Jersey's, having purchased a thoroughbred Jersey bull and two cows from Samuel Smoke. The bull Priam, of Maple Lane, No. 18125, sire Prince of Maple Lane, dam Lily of Maple Lane is of the St. Lambert strain, and is considered by good judges to be a very fine animal. Address, Brantford postoffice.

Wm. Snider, owner of Maple Leaf Dairy Farm, consisting of six nty-five acres, two miles northeast of Brantford, is proprietor of the Clyde stallion Athol, sixteen and one-half hands; weight 1,900 pounds. This stallion is evenly built, has heavy bone and muscle and great vitality. He also owns the coach horse Prince George, which is well built, both for beauty and strength and constitution. He is a sure foal getter, his record for 1886 being eighty-nine per cent live foals from mares served. His stock is held at high prices. Mr. Snider also does a large dairy business, having usually from twenty to thirty cows. Address, Brantford postoffice.

Walter Sage & Son, proprietors of Maple View Farm two and one-half miles northeast of Brantford, are breeders of shorthorned cattle, having bred to thoroughbred bulls for the past thirty years. They at present have five females, twenty-one males, eligible for register in D. H. B. Their stock has always brought the highest prices, which is sufficient guarantee of the quality. They also breed a good class of Clyde and coach horses, using the best imported stallions in the vicinity. The senior member of the firm has been popular for many years as a judge at the different fairs. Communications sent to Brantford postoffice will be promptly attended to.

Ash Bros., two and one-half miles northeast of Brantford, are breeders of roadster and Clyde horses. Their trotting mare, Jennie Scott, is a seal brown, sixteen hands; sire Winfield Scott, the sire of George B., 2:29; Theresa Scott, 2:25; Captain Scott, 2:37; and Post Boy, 2:32. Her dam by Glasgow horse, a son of Old Clear Grit; his dam by Old Battler, sire of Rapid, 2:37 to saddle; Varcoe, 2:37 to harness; 2d dam by Battersby's Royal George, 2:20; (pacer). They are breeding Jennie Scott to Pericles. This farm has six mares, which they are breeding to Clyde stallions. Maggie, sired by Justice dam's sire Champion has four Clyde crosses, and is in foal to Marquis (imported). Another mare sired by Agricola, G. D. by Cumberland, raised a colt in 1887 that sold for \$150 when three months old; another sold for \$200 at two years old. They sold a

full brother to Maggie for \$725 when coming two years old. Address, Brantford postoffice.

Daniel Burt, proprietor of Dumfries Hall Farm, consisting of five hundred acres, just outside the corporation of St. George and Robert Burt, of Woodland farm, two and one-half miles south of St. George, are breeders of shorthorned cattle, Berkshire hogs, and South-down sheep. They have fourteen female shorthorns and several males, registered in D. H. B. Myrtle 2d, sire Grand Duke of Gordon (imported), dam Myrtle 1st by Butterfly, traces to Beauty (imported). Lady Jane by Oxford Prince; dam Lena by Gaiway. These two cows represent the strains to be found in the herd. The original stock of Berkshires were from Bow Park, and their present stock boar is descended from H. Sorbig's bar thirty years. Their Southdowns have been bred pure for thirty years. They have seven brood mares, one from Whalbone, one, a Royal George, is mother of their other mares; sires Lurcher and Captain Scott. They are using the Cleveland bay stallion Venture. The barns and stables on each farm are commodious and nicely laid out. Postoffice address, St. George.

W. W. Batters, of Bank Head Farm, four miles north of St. George, is breeder of shorthorned cattle. He at present owns seven females and five males, registered in D. H. B., all pure Bates strain, except the bull Mandarin, (sired by the Earl of War) which is of the Booth strain. The stock from this herd has been sold in the Maritime Provinces, the United States and many parts of Ontario. Mr. Batters, though quite young, is very enthusiastic over his stock, and is bound to be in the front ranks. Young stock for sale. Address, Glenmorris postoffice.

Thorn Hill Farm, consisting of 385 acres, three miles south of Galt, is the property of W. W. Goodall. The farm is well located, has good buildings, and is under a high state of cultivation. Mr. Goodall is breeder of shorthorned cattle and Shropshire sheep. The nucleus of his herd of shorthorns is Donna Maria, got by Constance's Duke, dam Fancy by Oxford Earl. The remainder of the herd, consisting of eleven females and five males, are of the same strain, except the bull Lord Lorne, got by 6th Earl of Antrim, dam Rosina by Marquis of Lorne. Mr. Goodall's first stock of Shrops consisted of four imported ewes, and four ewes from the imported stock of T. C. Patteson. His stock ran Jack was bred at the Model Farm Guelph. He has two brood mares, one got by Ontario Chief, the other by Champion, and has been using the stallions Don Donald and British Flag. His farm and stock are for sale. Branchton postoffice.

John Mansz & Sons are breeders of shorthorn cattle, carriage and road horses. Their cattle are of the Bates and Booth families, with a strain of Rosedale blood. Buffalo Bill is at the head of their herd, a fine red animal and noted prize winner. Their carriage and road horses are well bred and tamed. Persons desiring anything in the horse or cattle line will find very choice stock to select from. Their postoffice is New Hamburg.

Wm. Thistle is a breeder of trotting and road horses, four miles south of Stratford. He is owner of the standard bred stallion Bay Jack, by Yellow Jack; he by Buckskin, he by Messenger; dam by Blackhawk Messenger a d Sir Trotten mare. He is a dark bay, sixteen hands high; record 2:36, and is one of the best bred horses in Canada. He took the silver medal at Natavassaga and other first prizes. Mr. Thistle has some fine colts sired by Bay Jack; all fine roadsters, and some showing great points for speed. His postoffice is Stratford.

The noted Hillside Farm, owned by J. W. Reid, of Toronto, is situated on the Grand river, two miles south of Paris. A beautiful spring furnishes water in the stock buildings. Mr. James Geddle is the business manager of the farm, and takes especial interest in his herd of shorthorns. He thoroughly understands stock breeding, and is considered a competent judge. The class of stock he keeps speaks volumes for his enterprise. The present head of the herd is 7th Earl of Durlington, registered in D. H. B., bred at Bow Park, got by Duke of Clarence (33,597), dam Darlington 25th, by Duke of Oxford 30th (33,712). This farm has also used Orpheus 18th (12,602). They have a herd of eight females from the Roan Duchess family, of the Bates strain of blood, and one cow of the Booth strain. They usually carry about thirty-five head, and have always a number of males and females for sale. In 1887 they sold thirty-two head at paying prices. Parties from a distance wishing to inspect the stock, will be met at the station and courteously entertained during their visit. Postoffice address, Paris, Ont.

J. E. Brethour is proprietor of Oak Lodge Stock Farm, Beertford. His herd was founded in 1881, two of the original cows being descendants of Duke of Cumberland 12, a prize winner at the Centennial Exhibition, Philadelphia. He now has eighteen head of pure breeds in his herd. Imported Scotch bulls are generally used. His present stock bull Prince, of Craignano (53,456; E. H. B.), was bred by Amos Cruikshank, his grandam Cornucopia being one of Mr. Cruikshank's best cows. He is a massive bull, on short legs, with good hind quarters and well sprung ribs. Mr. Brethour's stock of Berkshires is founded on purchases from Simmons, of Lolo, Middlesex county, and H. Sourby, of Gourock. They are from the best of sires, one of them Real Briton (488, imported), winning first prize at the following fairs in 1886: Industrial, Toronto; Provincial, Guelph; and Grand Dominion, Sherbrooke, Province of Quebec.

Charles McCabe, proprietor of hotel, Mechanic street, Paris, is a breeder of roadster horses, having a very fine brood mare which he is breeding to the most popular stallions. Mr. McCabe has an extensive knowledge of the veterinary art and has no superior in the town as a judge of horses.

The B. G. Tisdale Co., of Brantford, manufacture "Tisdale's Brantford Iron Stable Fittings." These fittings comprise everything which go to make a stable or barn a model of convenience and economy. Parties intending to build stables should therefore write for their illustrated catalogue and price list and will derive from it much information and many new ideas. These fittings never wear out and are guaranteed against breakage except by the barn falling. They are also guaranteed against injuring horses even in the coldest weather. Considering their lightness, neatness and portability they are just what is needed in every well-regulated stable.

LAMBTON COUNTY.

T. W. Smith, of Forest, is an importer of Percheron horses. His stallion, Young Royal (Nos. 1207, 822) weighing 1980 pounds, is a good representative of the Percheron breed. Several of his colts have been prize winners, and many of them have been sold for more than \$500 each. Mr. Smith also deals in the Little Brantford Cord Binder and the Combined Drill and Seeder. He is one of the enterprising men of the county.

Thomas C. Jackson, of Forest, is a general blacksmith and practical horseshoer. He spent many years in the States where he thoroughly learned his trade. He

makes a specialty of weighting and plating. Mr. Jackson is also a dealer in da k Brahma, Buff Cochins, and white and brown Leghorn chickens, and always has on hand eggs and pure bred birds.

A. S. Anderson, of Forest, is a liveryman, and deals in horses of all descriptions. He is now sending some of his best roadsters to Chicago in carload lots. Those desiring a first-class livery or horses of any kind will do well to call on him.

Edwards Bros., Gattford postoffice, breeders of registered shorthorn Durham cattle, Leicester sheep, Berkshire hogs, and heavy draft horses. Also, owner of the pure bred imported Clydesdale stallion Crown Prince. Now famous in this part of Canada for his good stock. Crown Prince's sire was the celebrated Campsie, dam by Garibaldi. Edwards Bros. have been very successful breeders, and their stock needs no other recommendation than the fact, that in 1887 they took forty-five prizes and two diplomas, twenty-nine being first prize.

B. Hallock, of Forest, is a dealer in flour, feed, grain, seed, etc., at the corner of King and Main streets. He also deals in coal oil, salt and wood. Being a good judge of a horse, he also deals in fine carriage horses, and always has one or more good steppers on hand. He is frequently called on to select horses for persons abroad.

Joseph Lowrie, of Sarnia, horseshoer, established 1852, Market Square. The Lowrie Works, manufacturers of all kinds of wagons, buggies and sleighs, and road carts for breaking colts. First prize for wagons, 1885 and 1886, at the Provincial Exhibition of Ontario, Christina and Vidal streets.

W. H. Hill is senior member of the firm of Hill, Simpson & Co., wholesale and retail grocers. He has been for the last fifteen years at the head of this well-known and popular house, always ready to serve the public in his genial and affable way. As he is a great lover of good horses, and always keeps one or more, he is looked upon as one of the boys.

J. H. Fairbank, of Petrolia, is devoting considerable attention to the breeding of standard bred and roadster horses. Among his stock is a pair of extra fine matched mares, that took first prize at Toronto and other places in 1881. They are full sisters, sired by Erin Chief, he by Howe's Royal George. The dam of the mares was Buffalo Girl, by Kentucky Whip. They are being bred to Monarch Jr. He has a very promising young stallion, (standard bred) by Caligula and other good ones.

John Dunfield, M. D., of Petrolia, a practicing physician, who takes a lively interest in good horses and is the owner of some good steppers.

Frank Parker, veterinary surgeon, of Petrolia, graduated from the Ontario Veterinary College of Toronto in 1884, and has been practicing his profession at Petrolia ever since. Is an attentive and successful practitioner, and enjoys the confidence of the horsemen in the community.

John Scott, of Petrolia, proprietor of the large livery and sale stables, in Petrolia, where he keeps a number of very fine driving horses and first-class rigs. Mr. Scott is a first-class judge of horses, and, being well acquainted with most of the horses for miles around, his services are often sought after by intending purchasers or parties wanting information in that line. An obliging man in his business, and justly popular with the traveling public.

A. H. Mackenzie, Coplestone postoffice, is owner of the trotting stallion "Opposition," sired by Old Clear Grit; he by the thoroughbred imported horse "Lapsadist." The Clear Grit stock is too well known to need any comment. An injury received when a colt, has pre-

vented opposition from being trained for speed. His dam's pedigree runs back to Royal George and Hambletonian stock, both well-known families of trotters. Among his get are a number of pace s; but, whether paces or trotters, they all have good action, and he has sired a number of very promising steppers.

Robert Witty, Coplestone postoffice, proprietor of the Marthaville House, and owner of the Royal George trotting stallion, "Little Frank," sired by Thomas Jefferson; he by Howe's Royal George, etc. Little Frank's dam was by Old Clear Grit. As both these distinguished breeds are well-known to horsemen, and extended pedigree is unnecessary. Little Frank, though more trained, but very little, is very speedy, and from his easy and rapid movement and grand appearance, seems to have inherited the action and endurance of both the illustrious families of which he is the off-spring.

George Fraser, of Petrolia, foundryman and manufacturer of farm implements and machinery used about oil mills. An admirer of good horses, and is breeding some roadsters.

D. Roche, of Watford, Lambton county, is a merchant, and the principal breeder of thoroughbred horses in the county; owner of the imported thoroughbred stallion Van Buren Dorn, known as Van Dorn, imported by Messrs. Boyle & Burgess, of Woodstock. For an extended description of Van Dorn see American Stud Book, vol. 1, pages 88 and 217. He is by Vandal, he by imported Glencoe; dam Dewdrop, by Lexington. His colts are invariably fine lookers and prize winners wherever shown. He is the sire of Vanetta R. and Villetta B., both bred and owned by Mr. Roche, and both very fast mare; the latter having beaten some of the fastest horses in Ontario. Mr. Roche also bred and owns the promising young chestnut stallion Cleveland, by Caligula, he by Equifer, he by imported Lexington; dam Vanetta R. by Van Dorn. Parties wanting to breed thoroughbreds or roadsters would do well to see these horses.

G. Alexander, veterinary surgeon, Watford, is an honorable graduate of the Toronto Veterinary College. After graduating in 1886, commenced the practice of his profession at Watford. Though a young man, he has been very successful, and is well patronized by all classes of the community.

Donald Alexander, Lot 8, Con. 6, Brigden postoffice. Mr. Alexander is one of the most prominent representative breeders of pure bred Crickshank shorthorned cattle in the county. He has an exceptionally fine herd, all of which are either imported or bred by Mr. Alexander, from imported Scotch cattle. Mr. Alexander is a thorough stockman and a reliable breeder.

Smith Stephens, Lot 10, Con. 2, Wanano postoffice. Mr. Stephens is a large farmer, and has recently commenced breeding Holstein cattle. Is owner of the celebrated imported bull Goldstone, bred by B. B. Lord & Son, of Sinclairville, N. Y. Goldstone is a very superior animal of his class. Also breeds Shropshire sheep.

Henry McGurk, Colville postoffice. Mr. McGurk is the oldest breeder of shorthorn Durham cattle in this part of the county, having commenced about twenty years ago with imported stock of the Bates strain of horses. Also breeder of pure bred Cotswold and Oxford down sheep. Has exported cattle and sheep to nearly all of the Western States. Is a reliable man and worthy the confidence of stockmen.

M. B. McGregor, Courtright. Mr. McGregor is the popular proprietor of the McGregor House, at Courtright, Ontario. This house has recently been greatly enlarged and newly furnished, and has become a very popular resort. From the piazzas can be had an un-

interrupted view of over ten miles of the beautiful St. Clair river. A steamer leaves the wharf, directly in front of the hotel every half hour for the "Oakland." A good livery in connection, in which are a number of first-class buggies. Also boats and fishing tackle kept to add to the comfort and enjoyment of his guests. A very desirable place for tourists to spend a few of the summer months. Mr. McGregor has been one of the prominent horsemen of the West, for the past twenty-five years, and is now a breeder of pure bred Berkshire hogs. Give him a call.

William Stewart, Coles Corners postoffice. Farmer and breeder of Polled Angus cattle, owning a very fine bull President, (No. 4871 American H. B., vol. 1; also heifer May Flower 3d, (No. 6882 American H. B., vol. 2). Both the above fine animals were bred by Geary Bros., of London.

John V. Battram, Brigden postoffice, hotelkeeper. Mr. Battram is the general and obliging proprietor of the Lorne House, the principal commercial hotel in the village. His son keeps a good livery in connection, and is also breeding some steppers and first-class roadsters.

S. Mallory, Brigden, owner of the very promising imported young trotting stallion Young War Cry, sired by War Dance; he by Lexington, out of the noted Reel, by imported Glencoe, etc. Young War Cry's dam was a celebrated French mare, with a record of 2:28. Young War Cry has had but little handling, but promises to become very speedy.

O. W. Chamberlin, of Petrolia; though a farmer, and largely interested in oil wells, Mr. Chamberlin devotes most of his time to the breeding and handling of horses. Breeds standard bred trotting horses. Is a thorough horseman, and an acknowledged authority on the subject of the horse. Has a good half mile track on his own farm, where he trains his own horses, and personally superintends their care and management. Owns a very promising young Hambletonian stallion Paris, (standard bred) by Mohican, he by Rysdyk's Hambletonian, dam Merry Lass, by Hambletonian; also has a yearling filly that bids fair to take rank amongst the flyers, as she has already shown a quarter at a 2:53 gait. Lovers of good horses, when visiting Petrolia, could spend a few hours profitably in looking through his stables.

C. A. Farr, of Petrolia, proprietor of the American Hotel, Petrolia, farmer, and breeder of shorthorn cattle. Has a splendid herd, all of which are registered in the D. S. H. B. As his stock deserves more than a passing notice, a few of the prominent ones are here given: Bull Victor, by Blazer, dam Joan; bull Charlie Victor, calved in 1885, bred by Mr. Farr, got by Victor, dam Lady Halton. Lady White, by Lord Ramsden, dam Lady Halton. Oxford Vic, by Victor, dam Oxford Princess, and a number of others all bred by himself. Also breeds thoroughbred Berkshire hogs and Leicester sheep. A very careful pains taking breeder. Parties wishing to improve their stock, would do well to communicate with him, or call at his stock farm, where he will take pleasure in showing his stock.

James Tremere is proprietor of the Chapman House, Sarnia. This is the best one dollar per day house in Western Ontario. It is convenient to depots and wharves, has good sample rooms, and attentive service. Mr. Tremere is one of the best landlords in Ontario.

Geo. F. Voorheis, of Port Huron, Mich., attorney-at-law, is an importer and breeder of Jersey cattle. All his stock is sold at private sale. Several of his herds are descended from Farmer's Son, owned by Judge Marston, of Detroit. The quality of his stock is shown by his cow Susie C., 14301, solid cream, black points, sired by Rubicon 1202, dam by Animosa 6876.

Neil Grant, Thornyhurst postoffice, Sombra township, is a graduate of the Ontario Veterinary College. He imported and owns the French draft or Percheron stallion (No. 24559) Renforth, French buck 1225. Mr. Grant is also a breeder of shorthorn cattle. As he has over a thousand acres of land, and is a veterinary surgeon, an importer and a breeder, he is brought quite prominently before the public.

Donald Simpson, of the firm of Hill, Simpson & Co., wholesale and retail grocers, Sarnia, is the owner of a fine farm, near town, and a breeder and importer of trotting and draft horses. Mr. Simpson is the owner and importer of Kentucky Jim, a standard bred stallion sired by the great Hambletonian Mambrino, 2:24 1/4; 1st dam Lady Cahill, 2:32; 2d dam Belle Clay, by Star Davis, thoroughbred. Kentucky Jim is a full half brother of Wild Rake, who defeated the best field of three year olds Kentucky has ever had in 2:24 1/4. In Kentucky Jim can be found strains of the best blood in America. Persons wishing good stock from a reliable party, should address D. Simpson, Box 91, Sarnia.

J. F. O'Neil is postmaster, reeve and grocerman, at Point Edward. He deals in road horses and English mastiff dogs. He has at present a fine Joe Gale colt, crossed by a Royal George; a Fulton by a Royal George mare, and some others. Mr. O'Neil is also a breeder of Plymouth Rock and white Brahma chickens. He is the representative man of Point Edward, as his many offices of trust testify.

J. G. Turner, of Point Edward, is proprietor of the Turner House. It is convenient to the wharves and depots, accessible to the quarantine and stock yards; and the Sarnia and Point Edward street cars pass the door. It is the favorite resort of importers and stockmen.

M. L. Ryan, of Forest, is proprietor of the American Hotel, and a dealer in roadsters. His fine Hambleton carriage horse lately made the best record of roadsters in a race with five starters. Mr. Ryan being a good judge of horses, is prepared to supply persons desiring them. He has a fine farm near the village.

Isaac Pickering, of Forest, is an importer of Clydesdale horses and one of the largest exporters of cattle in Lambton county. In 1885 Mr. Pickering went abroad and selected several fine stallions, among them Laird o' Bute (4,490), sired by Gilderoy (1,438); Duvaar (4,327), sired by Poltalloch (3,058), dam Maggie (4,407); Tree (4,761), sired by Lord Colin (3,316). He has imported stock for sale.

Parker & Germain are proprietors of the Forest Carriage and Wagon Works at Forest. They manufacture phaetons, road carts, cutters and sleighs, and have in addition an extensive blacksmithing and horseshoeing business. Both are practical workmen and superintend their works which they recently enlarged by about 5,000 square feet. As they are good judges of material and labor and have no high-priced bookkeepers or sinecures, they are prepared to furnish all goods at the most reasonable prices.

PERTH COUNTY.

Alexander Smith, St. Mary's, proprietor of Grand Avenue Farm, is an importer and breeder of Clydesdale horses, breeds registered shorthorn cattle, Plymouth Rock and white Leghorn poultry. Mr. Smith makes a specialty of importing Clydesdale horses and fillies and keeps on hand a good stock of them; imported and now owns Chillingham (3,505), and in 1887 imported a number of one and two year old fillies by such celebrated sires as Macgregor (1,487), And Reekie (1,920), and other first-class sires and dams.

George Spearin, St. Mary's postoffice, Box 228, is one of the oldest and best known breeders of heavy draft and general purpose horses in this part of the county, and one of the principal prize winners for a number of years. His stock consists of well bred brood mares, fillies and a promising young stallion, Laird of Perth, by imported Laird o' Urie (1,722), dam imported Bell of the Ball (591).

John Stephen, Anderson postoffice, importer and breeder of Clydesdales, also breeds fine bred roadster horses; imported and owns two pure bred Clydesdale mares, Lady Mary, by Harold; and Gem, by Gold.

J. W. Doyle, Stratford, proprietor of livery, board and sale stable, is an admirer of good horses and the owner of some fast steppers, and is breeding trotters from a Royal George mare and a standard bred horse.

Thomas Greenwood, Fullerton postoffice, is an old and well-known horseman; breeds heavy draft horses and pure bred Lincoln sheep; owner of imported stallion, Young King (3,363).

George Gill, Russeldale postoffice, breeder of shorthorn cattle, heavy draft horses and Suffolk swine. His cattle are bred direct from imported stock of good milking families and registered in D. H. B.

W. H. Gill, Russeldale postoffice, breeder of pure bred shorthorn Durham cattle; is one of the oldest and most extensive and successful breeders of this class in the township, has always kept and used an imported bull and cows from imported stock. Has a fine herd that are all registered in the D. H. B.

Robert Clark, Russeldale postoffice, breeds the best class of registered shorthorn cattle of the Bates strain, also heavy draft and roadster horses.

Hugh Thomson, St. Mary's, is one of the most popular and best known breeders of pure bred shorthorn cattle in the county, and always keeps on hand a large stock of registered animals, bred from such well-known and popular families as Wimple, Clementina, Isabella, Minnie, Annandales, Rosebuds and Matchless.

Wm. Gibb, V. S., St. Mary's, first graduated from G. H. Dadd's Veterinary College, of Boston, Mass., in 1859, after which he practiced his profession a number of years at Dumfries township, Ontario; also graduated from the Toronto Veterinary College in 1876; commenced the practice of his profession at St. Mary's in 1866, where he has since remained. He is a successful practitioner and has long enjoyed a lucrative practice and the confidence of horsemen and the community generally.

James Crerar, Shakespeare postoffice, proprietor of Beachridge Stock Farm and breeder of Clydesdale horses, shorthorn Durham cattle and Lincoln sheep; is an old, well-known and reliable breeder and started with Duchess the 6th from imported stock. Has quite an extensive herd of pure bred, registered cattle; also breeds high grades. Is an exporter, having exported both horses and cattle to the Western States. Catalogue will be sent on application.

John Sanderson, Hampstead postoffice, breeds grade cattle, roadster horses, Leicester and Shropshire sheep, white and brown Leghorn and Plymouth Rock poultry and Imperial Pekin ducks.

Henry Studer, breeder of Holstein cattle, has one of the best bred herds in Perth county. His imported bull, Lord Dalrymple (227, vol. 8), is from B. Lord's famous herd of New York. His imported cow, Grity, has a milk record of forty-nine pounds per day at three years. Barrington 2d, bred by Bollert Bros., of Oxford county, is a choice animal. Their young stock is all very fine, and purchasers would do well to look it over.

John B. Berg, Amulru postoffice, breeder of Clydesdale horses, registered shorthorn cattle and Shropshire and Oxford Down sheep.

Donald McTavish, Gadshill postoffice, breeder of heavy draft and general purpose horses, high grade Durham cattle, Leicester sheep and Berkshire swine.

Wm. Jones, Gadshill postoffice, breeds high class grade cattle, heavy draft and general purpose horses and Berkshire swine. Keeps a pure bred stock bull.

Fred Wahl, Hampstead postoffice, breeder of high grade cattle and heavy draft and general purpose horses.

White Bros., St. Mary's postoffice, are prominent and successful importers and breeders of Clydesdale horses. They have been engaged in the business some years, during which time they have imported a number of first-class horses, such as MacAlpine (2,986), by the famous sire Macgregor (1,387); Laird o' Urie (1,722), by Prince Charlie (628), and others. Prominent among their latest importations are Lord Clinton (4,515), sired by Grand Material (2,147), dam Jean 3d (503), and the promising young stallion, Lord Russell (see vol. 10), sired by Jordonslaw (3,343), dam Jeanie Young (5,885), by Druid (1,120). It will be seen by tracing Lord Russell's pedigree that he combines some of the choicest strains of the best families of Clydesdales. They also have some high bred Clydesdale mares, one from imported stock on both sides and eligible for registration in C. C. S. B. As they import only first-class stock and are reliable dealers, intending purchasers would find it to their interest to call on them.

Duncan Stewart, Hampstead postoffice, proprietor of Elmwood Farm and breeder of pure bred registered shorthorn cattle and general purpose horses. This herd consists of some exceptionally fine animals, both pure bred and high grades.

William Hart, Hampstead postoffice, proprietor of River View Farm and breeder of heavy draft horses and high grade shorthorn cattle.

David Bell, Shakespeare postoffice, breeder of heavy draft and roadster horses, high grade cattle and Berkshire hogs.

James Paterson, Shakespeare postoffice, is an old and reliable breeder of pure bred shorthorn cattle and high grades.

J. E. Ratz, Gadshill postoffice, proprietor of large roller process flouring mill and saw mill, general farmer and breeder of pure bred registered shorthorn cattle bred from imported stock; also high grades.

V. Litt & Sons are breeders of heavy draft horses and registered shorthorn cattle. They are part owners of the celebrated Clydesdale stallion, Gustave Brooks (vol. 8, C. C. S. B., Glasgow, Scotland), by Garnet Cross (1,602). This is one of the noted stallions of this part of Ontario. V. Litt & Sons are also breeding shorthorn cattle and expect to further increase this branch of their business, as they have headed their herd with good strains of blood.

Ford & Murphy, the leading dry goods merchants of Mitchell, have a first class store and an immense stock. They are also owners of some of the best bred horses. Their standard bred stallion, Thornwood (1,567, Wallace's Register), sired by Woodlon (1,568), dam Mag Strader, is one of the best bred horses in Canada. He is a descendant of the noted horses, Mambrino Chief, Messenger, Hambletonian and Clay, combining the blood of the four great trotting families. He has a record of 2:41 with slight training. Ford & Murphy also own a fine pair of roadsters by Clear Grit, dam a Celerity mare, with a record of 2:34½.

Andrew Sanderson, Amulru postoffice, breeds high grade shorthorn cattle and heavy draft horses.

J. B. Martyn, Mitchell, is importer and owner of the thoroughbred blood stallion, Ranlagh 2d, one of the best specimens of the English thoroughbred race horse in Canada. His sire, Cremoine, was one of the great turf winners both in England and France; his dam was Miss Evelyn. Ranlagh 2d has the blood of the best English turf horses, including such Scotch stars as Parmesan, Sweetmeat, Gladiator, Touchstone, Sultan and Birdcatcher.

Arbogast Bros., Peter and John, are farmers and breeders of heavy draft horses. They own the celebrated Clyde stallion, Gordon (3,067), by Prince of Glamis, also the imported stallion, Norman McLeod. These horses are among the best of their breed in the county and have been prize winners. Arbogast Bros. are also large dairymen and are breeding a choice lot of dairy cows. They have good stock for sale at all times. Their postoffice is Mitchell.

John Morris, of Stratford, does general blacksmithing, making a specialty of horseshoeing, weighing and shoeing trotters after the most approved plan. He treats all diseases of the hoof in a scientific manner and has the confidence and trade of the importers and horsemen.

John Cook, Jr., Mulru (?) postoffice, is a breeder of registered shorthorn cattle and one of the best feeders in Perth county. His herd contains many very choice animals, and he is well-known to all good breeders, having raised several celebrated cattle. He keeps on hand for sale registered cattle and pure bred Shropshire sheep.

Archibald McGillawee & Sons, Hampstead, are breeders of registered shorthorns. His herd is very fine and has taken many first prizes. None of his herd was thrown out in the new herd book. His sons are taking a lively interest in stock breeding.

John Pletsch, of Shakespeare, is a breeder of black Minorca, black Spanish, black, brown and white Leghorn and Plymouth Rock chickens. He keeps pure bred chickens, eggs and Italian bees always on hand. He is also a contractor, builder and house-mover.

W. J. Cleland, Ontario street, Stratford, is a manufacturer of wrought iron saddlery and builders' hardware. He makes a specialty of horseshoeing and does general blacksmithing, employing only the best workmen and charging only reasonable prices. His shop is next door to Forbes' livery stable.

Adam Thomson is a breeder of registered Clydesdale horses and pure bred border Leicester sheep. He is known as one of the leading breeders of Perth county. His postoffice is Shakespeare.

J. Hodgins, V. S., Mitchell, is a graduate of Toronto Veterinary College and is well posted in his profession. He has been located in Mitchell for the past two years and is well and favorably known. He is prepared to answer calls at all hours, day or night.

William Riddell, student of the Ontario Veterinary College, Toronto, is out at present with Dr. J. E. Cullen, of Shakespeare, Perth county, Ont.

Vance & Eby, of Shakespeare, have the celebrated imported horse King of Clydesdale. He is five years old, sixteen hands high and weighs 2,000 pounds (registered No. 2,905, vol. 6, page 776, C. C. S. B. of Scotland), sire Warrior, dam Lily, by Young Garibaldi. They have also the imported Shire stallion, Just in Time, sired by the noted horse, Lancashire Tom. His dam was sired by Waxwork. Postoffice address, Shakespeare; office at the Royal Hotel, of which Mr. Eby is proprietor.

John McCell, of Fairview Farm, is a breeder of registered shorthorns and driving horses, and is one of the representative men of Perth county. Among his stock are British Prince, sired by the Laird, Maid of Lorne 2d, Maid of Lorne 3d and Princess of Lorne 1th. He also has several fine colts, some sired by Carlisle, and one by Magician, all from first-class mares of fast stock.

J. & R. Forbes, of Stratford, are importers of Clydesdale horses and Shetland ponies. They deal in horses of all kinds. They are owners of the high bred imported Clydesdale stallion, Hattenberg. Their livery and sale stable is one of the largest and best equipped in Western Ontario. Few men are so well and favorably known. Their upright dealing, long experience and good judgment enable them to handle horses for themselves and others to the best advantage.

David McFarlane, breeder and importer of Clydesdale horses, has the following: Black Glen, imported in 1886, his sire was British Champion, dam Jess; also Knight of Annandale, foaled in 1885, sired by Lofty, dam Darling; Warstar (4,777, vol. 8), sire Warrior (902, vol. 1), dam Craiglenine (304, vol. 2). Mr. McFarlane has some very fine stock, which may be seen at his barn, Shakespeare, Ontario.

Thomson's Gold Dust, owned by B. Thomson. This horse is a golden chestnut, sired by Zilk Gold Dust (the first five year old horse that ever trotted a mile in 2:25); Thomson's Gold Dust, dam Lady Brown, by George Brown. Mr. Thomson, the owner, is the leading blacksmith and horseshoer of Shakespeare and has been engaged in the business for nineteen years. Address B. Thomson, Shakespeare, Perth county, Ont.

J. E. Cullin, graduate of the Ontario Veterinary College of Toronto, treats all diseases of domestic animals. Office and residence, Shakespeare, Perth county, Ontario.

John Puff is a breeder of grade cattle and heavy draft horses at North Easthope. Mr. Puff has always on hand a number of horses and cattle. He has on his farm a brick yard, which is at present leased to Robert Myers.

A. Hutchings, V. S., graduate of the Ontario Veterinary College, Toronto, treats all diseases of domestic animals. Office at Royal Hotel, Stratford, Ont.

Wm. Roy & Son, owners of Cloverdale Farm, are breeders of registered shorthorns. Mr. Roy is one of the practical farmers of his township, and his son being interested in fine stock, they have for the past five years been breeding and raising some choice animals, among which may be mentioned Paulina, Duchess the 16th and Duchess the 17th. Mr. Roy and son are acknowledged to be the leading breeders of shorthorns in the township.

Charles Brooks is an importer and breeder of heavy draft horses at Mitchell. He is one of the oldest importers in this part of Ontario, and has imported some of the best stock, such as Highland Chief, Scott's Wha Hae (4,006) and Old Lord Haddo. He now owns the famous imported Clydesdale stallion, McMaster (3,823), sired by McGregor (1,487); also a fine young stallion, His Lordship (5,077), sired by McGregor, and a very fine road mare.

Daniel DeCourcy, proprietor of the DeCourcy Stock Farm, is an importer and breeder of blooded swine. He is the champion breeder in this line in this part of Ontario, his specialties being Chester whites and Berkshires. His stock has taken many first prizes, and as he is one of the very few who can show all registered stock, he is prepared to furnish persons with the very best. His postoffice is Bornholme.

Geo. H. Kreamer, of Silverleaf Stock Farm, Mitchell, is a breeder of heavy draft horses. He owns some choice imported Clydesdales, among them Queen of the Harem (vol. 5, C. S. B., Glasgow, Scotland), sired by Osman Pasha (1,777, vol. 5); the young stallion, Lord Tennyson (5,176), sired by Auld Reekie (1,920), and several fine colts. Mr. Kreamer has a choice lot of cattle, many of them high grades, and does a large dairy business.

John Jacobs & Son, Mitchell, are farmers and breeders of draft horses. They own the following choice imported Clydesdale stallions: Gustave Brooke (vol. 8, C. S. B.), sired by Garnet Cross (1,402, vol. 4); Gay Lad (vol. 8, C. S. B.), sire Course Wall (1,420, vol. 3); dam Galloway Maid (2,243, vol. 6). At the head is Scott's Wha Hae (4,006, vol. 7), one of the best horses in Ontario. Mr. Jacobs and son are among the first as farmers and breeders.

John McTavish & Son are proprietors of Spruce Grove Farm, Gadshill. They are breeders of registered shorthorns, Clydesdale horses and pure bred black Leghorn, white Leghorn and Plymouth Rock chickens. In their herd can be found Darling, Mary Bell, Maud S. and many more of the same good quality. They always have on hand fine young horses, cattle and chickens.

Watson Frost & Co., of Mitchell are breeders and dealers in heavy draft and driving horses. They are owners of the famous imported Clydesdale stallion, Young Pride of Scotland (1,308). They also own the fine young stallion, Merry Prince, sired by King of Craigie (2,906), and a fine blood mare sired by Gold Dust, with a strain of Morgan blood. They are prepared to furnish good stock at all times.

John S. Coppin, of Mitchell, one of the enterprising business men of the place, has been bailiff for seventeen years and for eleven years has been inspector of licenses. He owns the Hicks Home livery, which is conducted by his son, a bright young man who is always ready to furnish his patrons with first-class turnouts.

Peter McTavish & Son, of Gadshill, are breeders of registered shorthorns and Clydesdale horses. They have one of the finest farms in northeast Hope township. Their large and well-arranged barns are specially adapted to their business. They have taken many first prizes on their stock.

T. Hagarty is proprietor of the Commercial Hotel, Stratford. This hotel being centrally located with fine sample rooms, good table and a genial landlord, has a fine trade and a host of friends. Mr. Hagarty has also fine farm in Ellis township, which he proposes to turn into a stock farm.

Harris Dean, graduate of Ontario Veterinary College, Toronto, Ont., treats all diseases of domestic animals. Office and residence, Tavistock, Ont.

Commercial Hotel, Tavistock, Ont. First-class accommodation for commercial men. Headquarters for stockmen. Otto Jung, Prop.

Thomas McKenzie, blacksmith, Tavistock, Ont., carries on a general blacksmithing business, and intends branching into the breeding of Clydesdale horses. He has the confidence and trade of the breeders of the surrounding country.

Francis Young, Staffa postoffice, breeder of heavy draft horses and good grade cattle; owner of the imported English cart horse, Black Douglas, sire Lord of the Manor, dam Pride of the East. This horse belongs to the most noted families of cart horses in England, his ancestors being among the greatest prize winners in that country.

Adam Mohr, breeder of shorthorn cattle, has some of the finest stock in Ontario and has taken no end of prizes. Baron Braweth (47,385) was got by Roan Gauntlet (35,284), dam Grizzle, by Grand Vizier (34,086). Mr. Mohr has now about thirty-five head of thoroughbred stock. Postoffice address, Adam Mohr, Tavistock, Ont.

Gardiner Bros., Farquhar postoffice, breeders of heavy draft horses and owners of the imported Clydesdale stallions, Randolph King (3,937), sire Orphan (1,498, vol. 3), dam Rosie Prince (1,375, vol. 5); and Stone Clover (2,438, vol. 5), sire Young Pride of Scotland (1,368, vol. 2), dam Doll of Culmain (55, vol. 2).

Benjamin Dunlop, Cromarty postoffice, breeder and importer of Clydesdale horses. In 1886, imported two promising young stallions, Warrior Boy, foaled May 23, 1885 (see vol. 9), sire Calendar (4,901, vol. 9), dam Lily (3,476, vol. 7); and Prince of Crook, foaled May 1885, sire Prince of Wales (573, vol. 1), dam Maggie of Auchinbu (3,420, vol. 7). Mr. Dunlop has some extra fine brood mares, well bred Southdown sheep, Suffolk hogs and good grade Durham cattle.

John Stephens, Woodham postoffice, is regarded as one of the representative horsemen of the locality. In 1883 he and Mr. John Fotheringham imported the now famous Percheron horse, Challenge, from the stock farm of Mr. M. W. Dunham, of Wayne, Illinois, who imported him from France in 1880. Challenge is an exceptionally good horse and has won first prizes wherever shown. In 1886 he took first prize and silver medal at Industrial Fair, Toronto. Mr. Stephens also owns the Clydesdale stallion, Young Clausman, sired by Old Clausman, dam by Conqueror. The above horses should engage the attention of farmers and others wishing to improve their stock.

James Wallis, Granton postoffice, importer and breeder of heavy draft horses and shorthorn Durham cattle; has a fine herd of cattle, bred direct from imported stock. Imported and owns that splendid English Shire horse, What's Wanted Yet, sired by What's Wanted (No. 2,332), dam Trimmer (vol. 3, page 143). What's Wanted was the champion stallion of England, winner of £1,000 prize in Blackpool, £30 and gold plate at Birmingham, and beat all the best horses in England. He is also the sire of more good stallions at the present day than any other horse in England.

Leonard Butson and Joseph Campbell, Staffa postoffice, breeders and dealers in horses and owners of the pure bred imported stallion, Stranrear (2,441), foaled in 1881, bred by Robt. Cochran, North Cairn, Scotland, sire Strathclyde (1,538), dam Countess of Stair (1,361), weight 1,900 pounds. This is a fine Clydesdale, having particularly good bony legs. Has been a prize winner on a number of different occasions.

Wm. M. Butson, Staffa postoffice, importer of Clydesdales. In 1886 imported from Scotland the two very fine young stallions, Young Lord Erskine (5,465, vol. 9) foaled May, 1885, sire Lord Erskine (1,744, vol. 4), dam Maggie Keir (2,498, vol. 6); McNiven (5,199, vol. 9), foaled May 24, 1885, sire Macdougall (2,269, vol. 5), dam Nancy of Watson (4,856, vol. 8). These are very promising young horses. At the spring fairs at Dublin, Mitchell, Seaforth and Staffa they took first and second prize and diploma at Staffa.

Samuel Ankerman, Fairview postoffice, is owner of Pleasant Valley Stock Farm and a breeder of heavy draft horses of the Clydesdale class. He owns the fine imported stallion, Good Luck (5,058, vol. 9), sire Coningsby (2,034, vol. 5), dam Kate by St. Colme (737, vol. 1), sire of granddam Star (824). He took first prize at Embro and Stratford. Mr. Ankerman has a number of good brood mares and some fine young stock, and also breeds pure Berkshire swine.

Walter Shillinglaw & Son, Chiselhurst postoffice, breeders of pure bred shorthorn cattle from imported stock and registered in N. D. H. B.; also quite largely engaged in exporting to the Western States.

Thomas Colquhoun, Gowrie postoffice, importer and breeder of Clydesdales. Has been a number of years extensively engaged in breeding, importing and dealing in pure bred Clydesdale horses. Is always at the front with something good. Now owns Glins (3,655, B. C. S. B. and 372, C. C. S. B.), imported by Robert Beith, of Bowmanville, August, 1886. Won first prize at spring stallion show held at Toronto in 1887, beating seventeen competitors. Color, bay with white feet and face, weighing 2,040 pounds. Owner of two imported registered mares, Wee Beauty (3,349), and Lady Montgomery (3,350, vol. 7); a three year old filly bred by himself and eligible for registration and a yearling stallion from imported registered stock; also breeding some roadsters from trotting stock. Mr. Colquhoun is a reliable dealer, and parties wishing to purchase anything in the line would do well to call on him.

Richard Hotham, Staffa postoffice, farmer and breeder of pure bred shorthorn cattle from registered stock, good grades, Berkshire swine and white Leghorn poultry.

J. Thompson, St. Mary's, owner of the standard bred stallion, Lord Randolph, foaled in July, 1883, sired by Clear Grit (859), dam Lady Dufae, a pacing mare of considerable notoriety with a record of 2:29 1/4, she by W. M. Rysdyk (5,703), by Rysdyk's Hambletonian.

W. H. Graham & Son, St. Mary's, importers and breeders of Clydesdale horses and proprietors of livery and sale stables, where they keep on hand a number of imported and Canadian bred Clydesdale stallions.

J. W. Robinson, St. Mary's postoffice, proprietor of Pleasant Home Stock Farm, breeder of pure bred Clydesdale horses and registered shorthorn cattle from imported stock; owner of imported Clydesdale stallion, Bay Wallace (4,840); also some fine Canadian bred Clydesdale mares from imported stock.

P. Whelihan, Thornhill Place, St. Mary's, importer and breeder of pure bred Norman-Percheron horses. Is the only man in this part of Ontario who imports direct from France. In 1883 he imported the following first-class stallions, viz: Prince of Normandy (2,710, French Stud Book), sired by Brilliant (755); Napoleon (2,712), by Venmouth (787); a noted horse owned by the Government, and Duke of Normandy (2,709), by the famous Vidocq (732), and he by Utopia (731); and two mares, Lily (2,708), by Brilliant (756), he by Coco 2d (714), and Mand (2,711), by Superior (730), and he by FAVORI (711). He also has the young stallions and two fillies bred by himself from the above stock. At the Western Fair, London, in 1885, the above horses won one diploma, three first and one second prize, competing against all the Percherons of any prominence in Ontario. Is also breeding Ayrshire cattle and Southdown sheep.

Thomas Crone, Fish Creek postoffice, breeder of heavy draft horses and owner of a very fine imported English cart horse, Harwell Enterprise (3,125), by Tom of Shires.

Wm. Steel, of Stratford, is a veterinary surgeon and a graduate of the Ontario Veterinary College. All diseases of domestic animals are treated, and as Dr. Steel has a large practice and is well liked, he is making a success of his business.

MIDDLESEX COUNTY.

J. H. Marshall, M. P., and R. H. Crump, of the firm of Marshall & Crump, London, are breeders of registered Holstein-Friesian cattle at "The Waltrons." The following is a pedigree of one of their animals: Sir Archibald of Aaggie (H. F. H. B., vol. 1, No. 598), calved May 11, 1885, sire Sir James of Aaggie (H. H. B., 1,452), he by Napoleon (N. H. B., 129), he by Jacob 2d (N. H. B., 56), he by Jacob 1st (N. H. B., 20), he by Rooker, dam of Sir James of Aaggie is Bles, with a record of sixty-four pounds of milk in a day on grass, dam Aaggie Ida (H. H. B., 2,600), with a record of seventy-five pounds of milk in one day and twenty pounds of butter in one week on grass. Aaggie Ida's sire was De Ruiter (N. H. B., 89), he by Jacob 2d (N. H. B., 56), etc. (See Sir James of Aaggie's pedigree.) This animal took the first prize for yearling bull at the Western Fair, London, 1886. Correspondence solicited.

Edward Beattie, of Derwent, is a breeder and dealer in registered shorthorns and Southdown sheep, and has some fine specimens of these breeds at his place. People desiring anything in these lines would do well to call on him.

Wm. Jackson, of Pond Mills, and W. G. Laidlaw, of Wilton Grove, comprise the firm of Jackson & Laidlaw, importers, breeders and dealers in registered Cotswold sheep. On their farms can be found several first prize winners of the Royal Stock Show, England. They have one ram thirty-eight inches high, and five feet long, weighing four hundred pounds. Wool of two and one-half months growth measures three and one-half inches. Messrs. Jackson & Laidlaw go abroad and make their own selections for importing. They have no public sales, but correspondence is solicited, and information will be freely given by a dressing them.

John Routledge, Hyde Park, has been engaged in breeding and dealing in imported shorthorn cattle for many years. He disposes of his surplus cattle at auction. He is now dealing in the Bates family, considering it one of the most profitable breeds for raising. He has a thoroughbred bull, Earl of Goodness, got by 4th Duke of Clarence of the Bow Park Farm, weighing 2,780 pounds. Mr. Routledge has some of the finest gaudes in this part of the country, and will give information and prices to parties desiring them.

S. B. Gorwill, of Ballymote, is a dealer in shorthorns. We give below pedigrees of some of his animals: Imported shorthorn bull Duke of Gueldens (47,740) Roan; calved March 20, 1882; bred by Amos Cruickshank, Sittytown, Scotland; got by Lainlash (45,025); dam Guelder Rose, by Pride of the Isles (35,072); dam Evening Star, by Royal Duke of Gloster (29,864); dam Morning Star, by Champion of England (17,526); dam Grandiflora, by Lord Sackville (13,249); dam Flora, by Fairfax Royal (6,987); dam Jessica, by Premier (6,308); dam Venus, by Saturn (5,089); dam Dairy Maid, by Favorite (6,997); dam by Grindon (3,942); dam bred by Mr. Rennie, of Phantassie; dam bred by Mr. Robertson, of Ladykirk.

Duke of Gueldens, a pure Cruickshank bull, imported from the famous Sittytown herd, by Mr. Jas. J. Davidson, of Balsam, Ontario.

Graham Bros., sons of James Graham, Ailsa Craig, are owners of Belvidere Stock Farm, and breeders of shorthorn cattle and Lincoln sheep. They have thirty-one head of registered shorthorns. Their bull Rosy Prince 6th, and their cow Lady Chesterfield, got by Baron Constance 2d (37,564), Maid of Darlington, Lady Bates, Rose Duchess, and Queen of Darlington, are all representative animals of their breed.

Lainlash, Pride of the Isles, Royal Duke of Gloster, Champion of England, and Lord Sackville, were all bred by Mr. Cruickshank, and were stock bulls in his noted herd.

Cow Buchan Lassie bred by John Isaac, of Bowmanstown; sired by Statesman 1st; dam Buchan Lassie imported.

Wm. Scatcherd is the resident, manager and partner in the Wyton Stock Farm. Mr. John N. Scatcherd, of Buffalo, being the senior member of the firm. Wyton Stock Farm is in the township of West Missouri, on the London branch of the Grand Trunk Railroad. Wyton station is on the farm. Persons wishing to see the stock are cordially invited to call, whether intending to purchase or not. On this farm, without a doubt, can be found one of the finest herds of Holstein and Friesian cattle in Ontario. The following pedigree will show the quality of stock they deal in: Sir James, of Aaggie (H. H. B., vol. 6, No. 1452), two years old, April 16th, 1884, imported 1882; sire Napoleon, (No. 129, N. H. B.); G. sire Jacob 2d (No. 56, N. H. B.); G. G. sire (No. 20, N. H. B.), sire, Rooker. Dam of Napoleon is Porelain 2d, (No. 392, N. H. B.). Dam of Sir James of Aaggie is blest with a record of sixty-four pounds of milk in one day on grass. Up to this date, all of Sir James' calves have been heifers. Sir James, of Aaggie, was bred by K. Wit, Twisk, North Holland. Address, Wyton Breeders' Association, Wyton, Ontario.

McDonald Bros., of Ailsa Craig, are proprietors of the Ailsa Carriage and Blacksmithing Works. Their work is all hand made and from the best material. Being expert workmen and personally overseeing their business, they have made work which has taken many first prizes at the London, Toronto and other fairs. Good work and reasonable prices have made them an enviable reputation.

Wm. K. McKerlie, of London, is one of the oldest race horse men in Ontario. He has owned, imported, or bred many of the best horses in this country, among them Matilda Jordan, whose colt, Trumpeter, won the Queen's Plate at Woodstock, and Mary Jordan, whose colt, Beacon, won the Queen's Plate at Hamilton. He has owned many other horses of equal merit. For full fifty years, for pleasure and profit, he has been engaged in this work, and now looks back on the past with quiet satisfaction.

Patrick Ryder, Lucan postoffice, farmer and importer of pure bred Clydesdale horses. Imported and owns Briar Bough, foaled May 10, 1886, sired by Gillie Callaine (3620, vol. 7), dam Bessie (1618, vol. 5); also, Visitor (vol. 10) foaled May 5th, 1886; sire Mounerith (No. 3014, vol. 6), dam Linn (1823, vol. 5). They are both very desirable young stallions.

Chas. T. Rosser, Denfield postoffice, breeder of roadsters and trotters, and owner of the standard bred trotting stallion Cheppacket (No. 2290, W. T. R.), bred by Hon. R. H. Baker, of Racine, Wis., sired by Governor Sprague (444) five years old, record 2:20½, and the sire of many trotters. Dam Grey mare by Grey Eagle (thoroughbred). Cheppacket has some very fine points, though no record, as he has never been into training. His stock is turning out well, and many of them give promise of being speedy, and are held at high prices.

James McCaffrey, Lucan postoffice, owns the imported Clydesdale stallion Northern Champion (No. 3868) imported by A. Carlton, of Wingham; sired by Coming Again (3532), dam Quicker (4019).

Artemas Bice, Claudeboye postoffice, is a very large farmer and extensive breeder for a number of years of registered Durham cattle, heavy draft, general purpose, and roadster horses.

Thos. Creighton, Birr postoffice, hotelkeeper and owner of the imported Clydesdale stallion Buccaneer, (No. 4272), sire Sir George, (No. 4716, vol. 8). Buccaneer's dam was Bess, (4080, vol. 7.) Also owns a stud colt by Tontin, he by Alexander's Abdallah, and a fine pure bred Clydesdale mare by Old Netherby, imported and is breeding Clydesdales.

H. B. Kennedy, Birr postoffice, has been for a number of years a prominent breeder of carriage horses. At the Centennial Exhibition he exhibited a pair of carriage horses, and took first prize, and sold them for \$15,000. They were afterward sold to Robert Bonner, Esq., of New York, for a fancy price.

P. Curtin, Adare postoffice, has been extensively engaged in importing Clydesdale horses for a number of years, during which time he has brought out twenty-five young stallions. Amongst his latest importations are the following: Freeman (No. 5,012, vol. 9), sire What Can I (No. 912, vol. 1); dam Pippet (No. 2,617, vol. 6). Lord Nelson, or Corsock (5,169, vol. 9), sire Gilderoy (No. 1,438, vol. 3); dam Madam (975, vol. 5). Glentuck (No. 5,050) by, Curly (1,947, vol. 9); dam Darling (No. 2,354, vol. 6); also the splendid young stallion Bonnie Doon (vol. 9), foaled July 10, 1884. Is a beautiful bay with ratch on face and one hind foot white; sire King of Clydesdale (No. 2,199, vol. 5); dam Mary of Newhouse (5,510, vol. 9). Mr. Curtin is a reliable dealer and being a first-class judge of horses, and having in view the improvement of the horse stock of the country, imports nothing but first-class horses. Parties wishing to invest in purebred Clydesdales would do well to call on him or write for particulars. Has exported some fine horses to Ohio and other Western States. Also keeps on hand a number of Canadian bred stallions.

Henry Boyd, Denfield postoffice, farmer and horseman, owner of Clydesdale stallion Golden Noble, imported, (No. 2,829, vol. 6); sire Johnnie Groat (No. 1,697, vol. 4); dam Bet (No. 1,029, vol. 5).

Henry Gansen, Strathroy postoffice, breeder of registered shorthorn Durham cattle from best families. Has fine stock bull Prince Tom, by Rob Roy; dam Jan.

Robert Grundy, Clandeboye postoffice, breeder of heavy horses. In 1883 he imported two Clydesdale stallions from Kirkcudbrightshire, Scotland, and is still the owner of one of them, a very fine type of his class, called Free Trade (No. 2,776, vol. 6). Also raises pure fowls of the following choice varieties, Plymouth Rock, Light Brahmas and Wyandots.

James Bell, Birr postoffice, dealer in and breeder of fine carriage and roadster horses. Has a number of excellent brood mares, some of which are very well bred. One by J. E. Rysdyk, Jr., and one by Highland and some promising young stock. A filly by Pluto Hiatoge, out of a thoroughbred mare is likely to become a very fast pacer.

George Storie, Birr postoffice, is a very successful breeder of first-class roadsters of the Royal George, Black Hawk, Imogen, and Hambletonian strains of blood. Took first prize in London in 1886 in carriage and roadster class and first and diploma at Lucan in same class beating twenty-nine competitors; also a number of other prizes.

Robert Alexander, Mullfarry postoffice, breeds heavy draft horses. Owner of the imported Clydesdale stallion Highland Laddie, alias Prince (No. 3,085, vol. 6), sired by His Royal Highness (No. 2,165); dam Kate (2,191). Highland Laddie was bred by Geo. Ewart, Orton Park, Jane Cumberland took first prize at London when three years old, and has taken a number of others.

John Morgan & Sons, of Cherry Grove farm, Kerwood postoffice, is quite extensively engaged in breeding shorthorn cattle, Shropshire sheep, and roadster horses. Has a fine herd of shorthorn Durhams, all bred direct from imported stock, and registered; issues a catalogue which will be furnished on application.

John Henderson, Coldstream postoffice, farmer and breeder. Owner of the imported Clydesdale horse Roy in Blue (No. 112, vol. 1, C. S. B.); was the winner of many prizes before leaving Scotland.

Messrs. C. A. Paul and J. T. Charlton, Coldstream postoffice, are both farmers and breeders of heavy draft and general purpose horses, and are joint owners of the celebrated purebred imported Clydesdale stallion Glengary, a beautiful dapple brown, standing 16½ hands high, weighing 2,180 pounds, having splendid action. Glengary was foaled in 1876, bred by Geo. Marr, Esq., Cairnbrogie, Oldmeldrum, Aberdeenshire, Scotland, and was imported in 1881 by Brooks & Colquhoun, of Mitchell, Ont.; sired by Farmer's Glory, dam Sally, of Udney, (1,209). This famous horse is certainly a magnificent specimen of Clydesdale, and was the winner of many prizes before leaving Scotland, and since he came to Canada has probably won more first prizes than any other horse of his class in the country. In 1884 he took first prize at Toronto against Clydesdales and Shire horses, and the silver medal against all ages, next week at London, Western Fair first for Clydesdale stallion and diploma against all ages, both Clyde dale and Shire horses, and six other firsts same year. In 1885, at Provincial Exhibition, London, first prize for Clydesdale stallion, and gold medal for best of any age in his class; also Prince of Wales prize for best draft stallion of any age or breed.

J. P. Whitehead, veterinary surgeon, Strathroy, is one of the most prominent and well-known veterinary surgeons in Western Ontario. Was a medalist at college, and always studied with a determination to master his profession. Is a man of original ideas and pleasing address, and very popular with a large proportion of the community in which he has so successfully practiced his profession, ever since he graduated from the Toronto Veterinary College, in 1880.

William Evelyn, veterinary surgeon, Strathroy, commenced the study and practice of his profession at St. Thomas, with his father, who was a veterinary surgeon from London, England. After a number of years' practice he attended the veterinary college in Toronto, and graduated in the spring of 1869. In the following winter located at Strathroy, and was the first licensed veterinary surgeon in that part of the country. Having had considerable experience as well as a thorough knowledge of his profession, he soon acquired a lucrative practice which he continues to enjoy.

John Johnston, Strathroy, is a general blacksmith and practical horse shoer. Is an admirer of Clydesdale horses and imported a couple of stallions of that breed. Now has the imported purebred Clydesdale stallion Rhynde Rover (No. 5,296, Clydesdale S. B., vol. 9), foaled May, 1882.

J. B. Lane, of Dorchester township, postoffice Dorchester Station, is a breeder and feeder of shorthorn cattle. Mr. Lane is an extensive farmer and has had many years' experience as a breeder and will be pleased to give information to any one desiring it.

James A. James, Nilestown postoffice, has a herd of registered Ayrshire cattle. We refer to one number only, which will indicate the character of his stock (No. 1,010 Dominion Ayrshire Breed Book, vol. 2). His registered stock has made him more than a local reputation. Mr. James also owns and operates a cheese factory.

OXFORD COUNTY.

D. McLachlan is a farmer and breeder, and owner of Plain View farm; has some of the best English Shire horses in Ontario. He has two imported stallions, William the Conqueror (570, vol. 1), by William the Conqueror (2,343), and Lincolnshire Lawyer. He also has a span of imported mares, said to be the finest in this section. Mr. McLachlan always has choice young stock on hand, and persons desiring anything in the Shire line should look over Plain View farm.

Thos. J. Cornish is owner of Maple Grove stock farm, and is one of the largest breeders of agricultural and general purpose horses in this township. He owns some sixteen head including the promising young stallion What's Wanted, by imported What's Wanted. He has taken eleven first prizes. Mr. Cornish has a fine Percheron team, sired by imported Pompadour, which took the citizens' prize, a silver tea set, value \$60.00, at Ingersoll, in 1887, in a class open to the world. He also has some heavy brood mares, by imported sires, and some promising colts, and generally may be said to keep on hand the best of stock in his line. Postoffice, Crampton.

John Longfield, owner of Maple Leaf stock farm, southwest of Ingersoll, is a breeder of heavy draft and general purpose horses, and in company with D. McLachlan owns two of the best imported English Shire horses in Middlesex county, William the Conqueror, kept at Mr. McLachlan's farm, and White Lawyer (2,821), sire Wellborn Sweep (2,315), dam Superior Cart Mare. He is a great stock raiser and has taken his share of first prizes. Mr. Longfield keeps good stock and may be addressed at Crampton.

Chas. Choate, proprietor of Brookside stock farm, four miles west of Ingersoll, is one of the large breeders of carriage and road horses. He has in his stables about twenty-five head, mostly of the celebrated Clear Grit stock. Many are brood mares by such sires as Daniel Webster, Little Ethan Allen, Fleetfoot, etc. Mr. Choate is always prepared to furnish good horses in the roadster and carriage class, and being a thorough horseman can guarantee his stock. His postoffice is Ingersoll.

Wm. Irwin, about four miles from London, has some fine Clydesdale grades of his own breeding, which he considers superior for early maturity, and as always commanding a good price. Any information will be cheerfully given, by addressing him at London.

J. W. Johnson, Sylvan postoffice, is an importer and breeder of Holstein-Friesian cattle, having one of the largest farms in West Williams township. He is in the business for pleasure as well as profit, and deals only in stock which can show a clean pedigree. Some of his original purchases were from the Wyton stock farm of Seabrook Bros., representing the Sir James Aggie blood. One of his bulls King Botterryk, was bred on this farm, and one of his cows, Edgely Belle, sired by Goldstone (No. 3,040 H. H. B.). Mr. Johnson would not have a grade Holstein on his farm.

Geary Bros., proprietors of the Bli Bro's. Stock Farm, London, and the Geary Bros. Co., proprietors of the Keller Lodge Stock Farm, Bothwell, stand at the head among breeders in their lines of stock in the world. They are importers and breeders of Polled Aberdeen, Angus cattle, English Shire horses, and Lincoln and Shropshire Down sheep. They always have on hand for sale young stock imported and home bred, and persons desiring to purchase should call on them.

Shore Bros., White Oak postoffice, are breeders of shorthorn cattle and Shropshire sheep. Their imported Cruickshank bull Vermillion, is a very fine animal; and they have some excellent stock in the Shropshire line from imported sires and dams. Their shipping station is London and their prices moderate.

W. C. C. Burns, owner of Cedarhurst Farm, one and one-half miles east of Princeton, consisting of 150 acres; also six and one-half acres of cedar and pine, five miles from homestead. There is a spring on farm, besides a small creek crossing the corner. There are three large barns with stone stabling under each. Mr. Burns is breeder of horses, Berkshire pigs and shorthorned cattle. His mare Duplax by Princeton is in foal to Dillard Wilkes; Gipsy by Buckshot; Eclipse is in foal to Harkaway. He also owns a trotting mare got by Highland Boy, dam a Royal George mare. He owns pure bred Berkshire sows, from which he is breeding by using imported boars. His heifer and bull both registered in D. H. B., will form the foundation of his herd of shorthorns. Postoffice address, Box 51, Princeton.

E. E. & J. F. Martin, Canning postoffice, are breeders of Berkshire hogs, Southdown and Shropshire sheep, and silver grey Dorkings, Rowen ducks and Brechen geese. They have a number of registered sows from imported stock, and a stock boar, Earl of Oxford, by Geneva Duke 65th. In Southdowns this firm is now breeding from the noted stock of Wm. Jackson, of Abington, and a Shropshire from the imported stock of John Conworth (the pioneer importer of Shropshires, in Ontario. Although in company in the stock, they work separate farms. E. E. Martin's farm, beautifully situated in a bend of the Nith river, is aptly called Nithside, and is three and one-half miles from Paris. J. F. Martin's farm, styled Hillgrove Lodge, is three and one-half miles east of Princeton, is under a high state of cultivation, and the corner is covered by a spring creek. Stock shipped to order. Satisfaction guaranteed.

Stover Bros., owners of Fern Glade Farm, one and three-quarter miles southwest of Norwich, breeders of shorthorn cattle and Berkshire and Poland China hogs. The present head of their herd of shorthorns is Prince George, registered in vol. III., B. A. H. B., sired by Earl of Goodness V., of Bow Park. The Stover Bros. are inventors of a simple, cheap and thoroughly practical stable cleaner, which can be operated by wind or tread power. The cost of this machine would not exceed \$2.00 per head for a herd of twenty-five. Shipping point on farm. A call solicited. Prompt attention to communications sent to Norwich postoffice, Ont.

Geo. S. Cavin, veterinary surgeon, office Stover street, Norwich. Diseases of horses and cattle treated on the most modern principles. Surgery a specialty. Teeth trimmed and extracted. Orders by mail or telegraph promptly attended to. Mr. Cavin owns The Star, record 2:47, sired by Albion, record 2:31½, dam Forest Maid, record 2:40½. He is a member of the firm of P. Cavin & Sons, North Bruce, owners of Highland George, a noted prize winner in the carriage class, also of the noted brood mares Juno and Berke.

N. S. Sovereign, proprietor of Fairview Farm, inside of the corporation of Tilsonburg. He owns the one-half mile track known as Tilsonburg Driving Park, and makes a study of handling and breaking driving horses. Mr. Sovereign imported the two Kentucky bred trotting stallions, Whistle Jacket and Hiram Happy. Whistle Jacket is a jet black, stands sixteen hands, and weighs 1,200 pounds, sired by Cassius M. Clay, jr. 1st dam Country Girl, by Country Gentleman, son of Rysdyk's Hambletonian. He has been duly registered in vol. III. Wallace's A. T. R. When only three years old, he trotted the last half mile of the 3d heat in 1:25. Hiram Happy stands fifteen hands and three inches, has immense bone and muscle, resembling his celebrated sire Mambrino Patchen. His 1st dam is Florence, by E. pert.

The firm of J. & W. Pringle, of Maple Lawn Farm, two and one-half miles northwest of Ayr, are extensive breeders of Percheron horses, and own the noted imported stallion Dantless (No. 823, P. S. B.). This stallion is a dapple gray, has clean cordy legs, good muscle, and is a good walker. They also own French Lion, (2,257, P. S. B.) a jet black, of lofty carriage and abundant vitality. French Lion is a sure foal getter, averaging eighty-five per cent living foals. A number of extra fine young horses for sale. This firm also breed Shropshire sheep and Holstein cattle. The original stock of sheep are from the flock of D. G. Hanner & Son, and the cattle from the herd of A. C. Hallman & Co. Postoffice address, Ayr.

D. D. Cornwell is importer and owner of the trotting stallion Lexington Boy, fifteen hands and two and one-half inches high, by Duncan Gibson, Lexington, Ky.; sired by Egbert, 1st dam by Richellen, by Mambrino Chief. Through his sire he is thrice inbred to Rysdyk's Hambletonian (sire of Dexter 2:17), and thirty-eight others in the '30 list, while through his dam he inherits a large infusion of the blood of Mambrino Chief, who sired Lady Thorne 2:18, and six others in the '30 list. His trotting blood is backed up by thoroughbred blood, having crosses to imported Messenger, imported Diomed, and through Marengo to Timoleon, who sired the grand dam of Mand S. Mr. Cornwell has a trotting track on his farm where he does some training himself. Postoffice address, Norwich.

A. B. Cook, M. D., the leading physician of Norwich, has an extensive and successful practice. During his connection with the army, he had unusual chances to become proficient in the art of surgery of which he now makes a specialty. Office, near Duke's Hotel.

Thomas Abraham, owner of Spring Hill Stock and Grain Farm, consisting of 212 acres, five and one-half miles southwest of Norwich, has usually about twenty-five horses, including brood mares and stallions. Among the number are: King Philip, a black French stallion, St. Lawrence strain; Almont Lightning from Whistle Jacket, foaled in 1883, stands fifteen hands and three and one-half inches, weighs 1,150 pounds, and shows a 2:40 gait; Whistle Jacket, Jr., sixteen hands, 1,200 pounds, has fine action, a span of carriage horses, sixteen hands, took first prize at Provincial fairs in 1885 and 1886. He has many other promising young horses, also a large stock of cattle and swine. Intending purchasers would do well to call on Mr. Abraham or write to him at Newark, Ontario.

Brookside Farm, consisting of 120 acres, one-quarter of a mile east of Norwich, is owned by H. & J. McKee, breeders of Ayrshire cattle. The head of the herd is Rory O'More, (1610, vol. 2, D. A. H. B.) a double grandson of Mars I. Lassie; the matron is from Grand Duke, 250, vol. 2, D. A. H. B. The remaining members of the herd keep up the reputation of the original stock. They also breed silver grey Dorkings from Bogue stock, London. Stock for sale. Address, Norwich postoffice, Ont.

G. M. Crighton is proprietor of the Embro Carriage Works, and the leading plater and shoer of Embro. Being a thorough mechanic he has the confidence of the horsemen of his locality. He also owns two of the best horses in the town, Embro Victor, by Chicago Volunteer, dam by Rysdyk's Hambletonian, with a record of 2:36, and a colt by Golden Age, his dam by a Sherry-cobbler.

H. & W. F. Bollert, of Maple Grove stock farm, are importers and breeders of Holstein cattle, having one of the finest herds in this part of Ontario. They own the famous bull Baridon (3,127), and any number of cows, all having remarkable milk records. They made

their first importation in 1884, and have been adding to the original herd by fresh importations, thus keeping up the quality of the stock. In 1886 they exhibited their herd at Toronto and Guelph, and took many prizes. They also pay some attention to raising Leicester sheep.

John Landreth is proprietor of the Union Hotel, Tavistock, one of the best kept hotels in Oxford county. A lover of good horses he owns some fine animals, among which are some of the best roadsters of this section. He has a young horse, by Combination, which shows good points of speed; also a fine young mare, by Chicago Volunteer, dam by a Foxhunter. This mare is a natural pacer, and, although never trained, makes a mile to road wagons in less than four minutes.

Joseph Vance is an importer and breeder of Clydesdale and coach horses. He has been in the business over twenty-five years. Among some of his noted importations are the following: Conqueror, Clydesdale Jack, Duke of Edinburgh and Luscull. Among the celebrated horses still in his stables are, Uncle Charles, Wigton Lad, Vanderbilt, and the fine imported mare Fickle Fortune. These are all noted prize winners. Mr. Vance's postoffice is Tavistock.

W. W. Sutherland is an enterprising young farmer and breeder of shorthorn cattle and heavy draft horses located five miles north of Ingersoll. He is grading up his stock and is making a specialty of dairy cows, and has good stock of this class for sale. He also has something in the heavy draft horse line always on hand.

Geo. Thomson, of Sunnyside farm, is a breeder of shorthorn cattle, registered Southdown sheep, Berkshire swine, Brown China geese, Light Brahma, Plymouth Rock and White Leghorn chickens, and Bronze turkeys. At Philadelphia, in 1876, his Ayrshire cattle took the following prizes: second prize on bull, a bronze medal and diploma; on cow, the Centennial award, a large bronze medal and gold medal sweepstake for best in milk class from Canada. Mr. Thomson's herd includes twenty-seven registered animals and many choice grades. He has one of the finest flocks of Southdown sheep in the county, and his Berkshire swine are purebred and registered. He also has some good horses, among them some well bred roadsters. Postoffice Bright.

James Matheson, owner of Spring Creek farm, of 300 acres, is a breeder of Clydesdale horses, shorthorn and Hereford cattle, Suffolk and Berkshire swine and Shropshire down sheep. He has some fine Clyde horses, among them some good stallions from noted sires, while his flock of Shropshires and herd of shorthorns are among the best in the county. He recently imported a Hereford bull and cow and will make a specialty of this breed. His postoffice is Harrington.

Hugh Matheson, dairyman and cheese manufacturer, is the owner of Cold Springs cheese factory. For the past twenty-three years he has shipped every pound of his cheese to one firm in England. He makes about thirty-two cheese per day or about one ton. The factory is supplied with all modern conveniences and takes its name from the spring which has its source under the building. This is one of the finest springs of pure water in Ontario. Mr. Matheson owns a model farm of 100 acres.

David McPherson & Son, owners of Fairview farm, of 300 acres, two miles west of Embro, are breeding some choice heavy draft horses, high grade shorthorn, cattle, Southdown sheep and Berkshire swine. Pride of Fairview sired by imported Clydesdale Superior, dam by Honest Jimmie, and Young Superior sired by Superior, are two of their fine stallions. They keep good stock for the market on hand at all times.

D. McKenzie, the leading blacksmith and horseshoer, of Ingersoll, is a practical mechanic and understands the art of shoeing and plating in all its branches. He keeps only first-class workmen and has gained the confidence of the horsemen of Ingersoll and vicinity.

Geo. Kempshell, veterinary surgeon, Ingersoll, is one of the oldest veterinary surgeons in Ontario, having graduated in 1866. He located in Ingersoll the next year and has been in active practice ever since, working up a large business. He understands his profession thoroughly and has hosts of friends. His office is in Gaffee's drug store, Thomas street.

John McComb, Harrington postoffice, is a farmer and breeder of shorthorn cattle, Leicester sheep and heavy draft horses. He has about forty head of shorthorns, among them Royal Oxford, a pure bred bull of the Booth family. His flock of Leicester sheep are among the county, as he makes a specialty of this breed and has always kept them up with imported stock. He is also breeding heavy draft horses from imported Clydesdale stallions, and is putting some good teams on the market.

John Blair, owner of Calla Hill farm, of 200 acres, two miles west of Embro, is breeding shorthorn cattle and Berkshire swine. He keeps from seventy-five to one hundred head of cattle, among them the pure bred shorthorn bull Lansdowne and a fine pure bred cow Duchess, both from the Craikshank family. Mr. Blair buys stock and feeds it for the market, and intending purchasers would do well to write to him.

James Reid, farmer and breeder, is owner of River-view stock farm, watered by the Thames river. He is a breeder of Percheron and Hambletonian horses, shorthorn cattle and Berkshire swine. His Percheron and Hambletonian brood mares, a young stallion by Chicago Volunteer, a mare Kitty which can do better than three minutes without training, and a fine Percheron colt by Milano, all indicate the character of his stock. Mr. Reid devotes considerable attention to breeding pure Berkshire swine, and does a fine business in this line. Postoffice, East Missouri.

Geo. S. McLeod, of Broadway farm, consisting of 100 acres, two miles southwest of Embro, is a breeder of shorthorn cattle and Berkshire swine. His shorthorn bull Lord Eskine, by the celebrated imported Earl of Mar (47,815), dam Annie Lee by Star of Hope; grand dam Lily by Marion, Duke of Airdrie, etc., will give an idea of the character of his stock. Mr. McLeod also owns some pure bred registered Berkshires and will make a specialty of this kind of swine and shorthorn cattle. His postoffice is Embro.

J. W. Gagnier, blacksmith, Stover street, south of Brady House, Norwich, Ont. Special attention given to shoeing horses that overreach or interfere. Has a wide and favorable reputation for shoeing roadsters.

D. Forestry, Norwich, Ont., proprietor of livery stable near Brady House. Any person wishing a first-class outfit would do well to call on him.

John Morgan owns a nice 100 acre farm, one and one-half miles southeast of Norwich. He has an A1 driving mare and many high grade cattle suitable for market.

Gilbert Dunkin, owner of 225 acres, one and one-fourth miles west of Norwich, possesses a fine roadster, got by Princeton, which shows a three minute gait. He also owns a thoroughbred bull, from which he is crossing and working into high grades suitable for market. Address, Norwich, Ont.

Peter Stauffer, of Springdale Farm, situated centrally between Bright, Drumbo and Ayr, seven miles from each, breeder of shorthorned cattle. Among his present herd are: Lady Jean, sire Constance Duke, he by

Duke of Elmhurst (22,735), dam Lady Lisgar, got by President Lincoln (1,181). Dam of Lady Jean's sire sold for \$1,600 at Col. King's sale, Chicago, in 1874. Mr. Stauffer also owns a red calf, daughter of Lady Jean, sire Duke of Colonus of the Lally tribe. These two females will form the nucleus of his future herd. He also breeds Berkshire hogs, the matron being Lady Macdonald 2d (692), sire Sir John A. (378), dam Lady Macdonald 1st (691), a direct descendant of Davidson's Lass (678). This sow has a litter of five from Dr. Tupper. Mr. S. also breeds Shropshires and crosses. Postoffice address, Washington, Ont.

Samuel Smoke & Sons, proprietors of Maple Lane Farm, four miles west of Paris are the most prominent breeders of Jerseys in Western Ontario. Their herd now consists of twenty-two females and three males. The present head of the herd is King Hugh of St. Anne's (16,396), a pure St. Lambert, sire Orloff Stoke Pogis (11,157), dam Queen of St. Anne's (25,713). Among his females are: Clover Smith (29,523), sire Gov. Lorne (3,586), dam Lady Lorne (7,892); Baronet's Victory (20,740), got by Baronet, dam Victory, imported by Mr. Fuller of Hamilton; Violet of Glen Rouge (20,755), sire Middlefield Boy (1,331), dam Honey Moon of St. Lambert; St. Lambert's Beauty (41,069), from Diana's Rieter, from Sir George of St. Lambert, dam Beauty of Lee Farm, from Beauty of St. Lambert. Address communications to Canning postoffice, Ont.

J. H. Kennedy & Son, proprietors of Riverview Farm, four miles west of Paris, breeders of roadsters and carriage horses. Their present brood mares are Dolly K., by Clear Grit, dam by Black George 2d, dam by Toronto Chief; Nellie C., by Clear Grit 1st, dam by Fox Hunter 2d, dam by Southern Eclipse; also two other mares, which they are breeding to the most celebrated stallions. They have a yearling filly from Dolly K., by Chicago Volunteer and a filly foaled in 1887 from Brookmaker, a yearling filly from Nellie C., by Captain Scott, he by Winfield Scott; also a colt by Bookmaker. They sold Priscilla, foaled in 1885 from Nellie C., by Pericles, to Merrill & Stinson for \$1,000. This firm imported Norval from Emery's stock farm, Ohio. This colt is sired by Nugget, record 2:20, he by Wedgewood 2:19, dam Vesper Belle, by Belmont, and has seven standard crosses. Postoffice address, Canning, Ont.

Angus Munro is owner and proprietor of the Munro House, Embro. He is well and familiarly known as a hotel man, and is one of the best horsemen in the county. His imported Percheron stallion, Milano (2,654, 1,260), is the best of his breed in the county. Mr. Munro also owns a fine roadster, a Clear Grit mare, by Old Clear Grit. Mr. Munro is one of the enterprising men of Oxford county.

Charles Wilson owner of the tannery, Woodstock, is a breeder of trotting and road horses. He has a choice lot of horses on hand, among them the imported standard bred stallion, Tom Carlyle (4,225), sired by Volunteer, dam Nora. Volunteer is sire of St. Julian 2:11, Hymettus 2:20, Driver 2:09, and nineteen others in the 2:30 class. Tom Carlyle is said to be one of the best bred descendants of Volunteer in Canada. Mr. Wilson also owns a young stallion by Volunteer, and some fine brood mares from Royal George and Clear Grit.

Alexander Campbell, of Rolling Prairie Stock Farm, is a breeder of English Shire and Clydesdale horses. His English Shire stallion, England's Glory, was imported by Mr. Millman of Woodstock. He has some choice young stock in Clydes by imported sires, and a fine young Percheron by the imported stallion, Milano. Mr. Campbell's address is Embro.

Walter Ross, proprietor of Ross's Hotel, Youngsville, is an importer of and dealer in Clydesdale horses. He imported the celebrated Clyde stallion, What's Wanted, and Jessie, a fine Clydesdale, and the champion brood mare. Mr. Ross owns the fine imported Clyde stallion, Glendale, (4,410) by Belted Knight, (1,395); he by Glendee, (363). Any communications addressed to Mr. Ross, Youngsville, will receive prompt attention.

Ira Hummason, farmer and breeder, has a fine place half a mile from Youngsville. He owns the imported Clydesdale stallion, Laird of Buchal, (4,492) vol. 8, sired by Top Gallant, he by Old Barnley, one of the best Clydes in Scotland. Mr. Hummason is a noted horseman, and former owner of Honest Jimmie and Pride of Borgne. His address is Youngsville.

James Gibb, Brookside postoffice, owner of Sunny-side Stock Farm, of 200 acres, near Embro, is a leading breeder of shorthorn cattle. He has some forty-seven head, of which fifteen are registered, among them the bull, Crown Jewel, containing the Booth blood and from the May Queen family. His cows are all from the Bates and Princess families; among them White Rose, by imported Scotchman, and Nerroe by 3d Duke of Linden. Mr. Gibb is a practical breeder and his stock will be found desirable by purchasers.

Henry Herlick is proprietor of the Muro House, Embro; is a pushing young business man, and leading hotel man of Embro. He is a good judge of horses and has owned several fine animals. He is now owner of the imported Clydesdale stallion, Lord Selkirk, one of the largest of his kind in the county, and in every way a desirable horse.

Abram Rowell, owner of Balsam Grove Stock Farm, seven miles northeast of Woodstock is a breeder of Hols en cattle, carriage and road horses. He owns the Hambletonian stallion, Hugh Cameron, by Stephen A. Douglass, by Rysdyk's Hambletonian, by Abdallah, by Mambrino; dam Erns by Woods' Hambletonian, &c. This stallion contains the blood of the greatest trotting families in America, the Hambletonian, Messenger and Clay. Mr. Rowell has some fine brood mares and is raising some of the best roadsters in Oxford county.

Wm. McMurray, proprietor of the McMurray House, Ingersoll, is one of the leading horsemen of the place, and owner of the pacing mare, Nellie, sired by old Clear Grit, dam a Lapidist mare. Nellie shows points for great speed and endurance, is perfect in disposition, and is said to be the handsomest mare in Ingersoll or vicinity. Without training she can make a mile inside of three minutes.

Wier Bros., Brenar postoffice, owners of Elmtree Farm, are breeders of carriage and road horses. They have been breeding light horses by the combination of Fearnought and other good families, and a few good brood mares of the Clydesdale class. They breed expressly for the market, and buy and sell high grade short horns. They are honorable business men.

McDonald Bros., Woodstock postoffice, are owners of Craiglea, a beautiful farm of 300 acres. They are well known breeders of short horns, having a herd of seventy with thirty registered, among them the choice bull, Valasco 7. Their stock is from the Cruikshank, Bates and Beauty families, and ranks with the best. Young stock always for sale.

Isaac Halleck, South Zora postoffice, proprietor of Hickory Tree Farm, is a breeder of shorthorn cattle and Cotswold sheep. In company with John Monroe, he owns the Clydesdale stallion, Brave Graham (4,875). He was sired by Montrose (2,293), dam Maude (5,200), sired by Vauquish (890). Graham is one of the best bred Clydesdales in this section.

James Sutherland, M. P., is one of the representative horsemen of Woodstock. At his stables, which are models of neatness and convenience, may be found the following choice horses: Exile, a brood mare by Warwick Boy, her dam by Highland Boy; Mary S., another fine brood mare, by Chicago Volunteer, her dam by Royal George; the pacing mare, Lady Meda by Adison Lambert, he by Dan Lambert, her dam by Ethan Allen. Mr. John Sharen has charge of the stables and owns the fine black mare, Volatile, by Chicago Volunteer, her dam by Lady Rysdyk, by Rysdyk's Hambletonian. Mr. Sharen is the leading driver and trainer in this part of Ontario.

McKay Bros., Brenar postoffice, owners of Bird Creek Farm, are breeders of shorthorn cattle, agricultural and carriage horses, Berkshire swine, Shropshire and Leicester sheep. Among their herd of shorthorns is Gloster's Prince, and several animals of the Booth and Bates families. Their specialty is carriage horses, four of their brood mares being of the Royal George and Baron Rothschild families. They are prepared to furnish good stock in any of their lines.

Thos. Masters, owner of Riverside Stock Farm, near Embro, is an enterprising young breeder of Clydesdale horses. He has a fine young stallion Scotchman, by old Scotchman and some choice young mares. He makes a specialty of Clyde horses, and as he is practical and understands his business, he can furnish good stock for the market. Address him at Embro.

G. A. Murray, breeder, exporter and dealer in stock, is owner of Willowdale Stock Farm, four miles northwest of Woodstock. He is a large breeder of swine, making a specialty of Poland China, at the same time giving some attention to breeding heavy draft horses. Most of his stock is shipped to Buffalo, N. Y. Mr. Murray is an enterprising man, honorable in his dealings, and persons having stock for sale would do well to write to him.

Walter Nichol & Bros., one mile from Plattville, are breeders of Ayrshire cattle, Leicester sheep, and Clydesdale horses. Their herd of Ayrshires number twenty-six, of which three bulls and six cows are registered. Ramsay Lad (1,386), and Gladstone (4,333), are fine bulls, and of their choice cows we name, Fancy (1,001), Keat (1,245) and Daisy of Oxford (4,335). They have a famous flock of Leicester sheep, having ewes from imported stock, and the imported ram No. 12, of Clark's stock, Humpstead, England. They took the first prize at Toronto, and first prize and diploma at London.

W. G. Brown, of Bright, is owner of two fine stallions, Fitz-Campbell (4,372), by Fitz Lyon (1,659), one of the fine Clydesdale stallions of this section, and Kennedy Punch, sired by imported Honest Jimmie. Kennedy Punch is one of the handsomest horses ever put in a show ring, and has taken more first prizes than any horse of his age in Oxford county.

James Dalzell, is one of the best known importers of Clydesdale horses in Oxford county. His first importation was Byron, in 1856. Since then he has imported Captain Watts, Scotchman, Honest Will, Marquis of Lorne, Carlyle, Dalballe, The Douglass, Bryde Kirk-Boy, The Baker, McCowin, The Laird of Miffield, and many others. He now owns five imported stallions and one brood mare. The stallions are Carlyle, Bryde Kirk Boy (2,643), Springhouse (4,330), by Pride of Dee (3,068), McCowin (5,190), McGregor (1,487), and Laird of Miffield, by Prince of Newton (3,924). His postoffice is Chester.

John Steele, Thorncliffe postoffice, breeder of shorthorn cattle. His herd is bred from imported stock, and registered in D. 1813.

C. R. Decker, proprietor of the city blacksmith and wagon shops, Chesterfield, is one of the largest breeders of Berkshire swine in the county. He is owner of the celebrated boar Sir John A. McDonald, registered as No. 378, C. B. S. R. Dr. Tupper, No. 578, and Bismarck are also choice animals. Mr. Decker is making a specialty of Berkshires, and can furnish choice stock to those desiring it.

Chas. Dalgleish is an importer of Clydesdale stallions, near Chesterfield. Among his importations are the following: Old Falkirk, Lad, Warrior, Just in Time, A 1, Ninian Stuart, Oxford King (3,875), by Duke of Hamilton (2,075), Laird o' Logan (2,928) by Old Times, Perfect Type (5,239) by Admiral (2,550), Kilbride Warrior, alias Warrior (3,708), by Warrior (902), one of the best feathered horses in the province. The four last horses are still owned by Mr. Dalgleish. He is a thorough horseman, and his importations rank with the best.

Wm. Donaldson is owner of a farm of 300 acres, five miles north of Woodstock. This is the Banner Stock Farm, having won the gold medal as the best farm in six counties, and silver service as the second in Ontario. Mr. Donaldson is a large breeder of shorthorn cattle, Shropshire down sheep, Berkshire swine, and Clydesdale horses. His bull Royal Victor, D. S. H. H. B., for his age, has no superior. Vesta, Fane, Pride and Model are a few of his choice cows, his herd running in the Cruikshank, Bates and Princess strains of blood. His Shropshires are headed by imported stock bred by Lord Polworth, and are among the best. Mr. Donaldson is a genial gentleman and well posted in stock matters of America and Great Britain. His post-office is Southford.

Wm. Murray, Chesterfield postoffice, is the owner of Colonus Stock Farm and an importer and breeder of shorthorns, Oxford down sheep, and pure Berkshire swine. He has two imported bulls, 8th Duke of Leicester (9,279, D. H. H. B.), and Duke of Salisbury (52,780, 9,280), besides other fine bulls and numerous choice young stock. His stock are from the Oxford, Barrington, Waterloo, Dordington and Princess families. His flock of Oxford down sheep are second to none in the country.

Alexander Morrison, of Chesterfield, is an enterprising young importer of Clydesdale stallions. He owns the promising young stallion, Laird of Ardoe, vol. x, C. H. S. of G. B. and I., sired by Newhall (3,859). Mr. Munison will make a specialty of importing, and persons desiring anything in his line should write to him.

Robert Murray, of Brook Stock Farm, four miles north of Woodstock, is a breeder of carriage and road horses. He has some choice brood mares, one of them a Clear Grit, and the others from well-known sires. One of his coach mares has taken first prize wherever shown. Mr. Murray is also a breeder of high grade shorthorn cattle, and is crossing Southdown and Leicester sheep with success. His reputation as a breeder is second to none in the county.

J. B. Thornton, Sweabury postoffice, Evergreen Park Farm, south of Woodstock, is a breeder of heavy draft, trotting and saddle horses. He imported in 1872, the noted stallion Superior (838) and ten brood mares. Among his horses are the stallion Oxford Lad (29), by Superior, and his imported mares Lady Douglas (24) and May Queen (25). Mr. Thornton has also done quite a business in light horses, and has a fine half mile track on his farm for training purposes.

T. J. Lovess, of Rosedale Stock Farm, is a breeder of heavy draft horses. Among his stock are some imported animals. His imported mare Queen of Clydes by St. Lawrence, he considers the best Clydesdale mare in

Oxford county, she having taken more first prizes than any mare of her age. Lady Grand 2d, No. 42, by Lord Derby (2,055) is a direct descendant of the celebrated horse Lord Haddo. Another fine stallion is Lord Wigton (565) by Wigton Lad (552, 5,441), dam Lady Grand 2d. He also has some fine horses by imported stock, among them being King of Clydes, Just in Time, and others. His postoffice is Strathtallen.

Robert Ross, Breinar postoffice, Mapletree Stock Farm, is a breeder of draft horses and Southdown sheep. He has three fine Percheron horses a Percheron stallion, Pride of Ross by imported Malino (2,654), and a choice young mare sired by Malino. Mr. Ross is a breeder of Chester white hogs, and has some of the best in the county.

Neil Swarts is owner of Willowbrook Farm of 280 acres, midway between Woodstock and Ingersoll. He is an importer and breeder of heavy draft horses, and owner of the well-known stallion Nero. This is one of the best Clydesdale stallions in Oxford county. He has taken first prizes at nearly every place exhibited. Mr. Swarts has some choice young stock, and keeps something good for sale at all times.

Robert Melville, Maplewood postoffice, is a breeder of heavy draft horses, and president of the Agricultural Society of East Zora and Tavistock. Among his fine stock may be mentioned his Clydesdale brood mare Queen, a winner of many first prizes; also his stallion Pride of Melville by Just in Time, dam Queen. He also has a fine mare by Major, and many other good horses. His farm of 250 acres is one of the fine farms of the township.

P. Farrell, of the Royal Hotel, Woodstock, is associated with Chas. Boyle, and does a large business importing, exporting and dealing in horses. Mr. Farrell breeds carriage and road horses, and has such fine standard bred animals as the following: Volunteer and two fillies by Chicago Volunteer; Bookmaker, a full brother of Maid S, combining the blood of the four great trotting families, Mambino, Messenger, Clay and Hambletonian; also Estill by Norfolk, and Lansdowne by Stratford. He also owns the trotting stallion Wilford Z., record 2:22.

John Wagester & Sons are breeders of Clydesdale and English Shire horses. Mr. Wagester has bred some fine horses, such as Luxall, by imported Luxall and Young England's Glory, by imported England's Glory. He has now some fine horses on hand, among them Young Scotchman by Old Scotchman (imported), and a young Shire stallion by Just in Time (imported), dam by Duke of Edinburgh. He has some fine horses and brood mares in the heavy draft class, and some light horses, among them a mare by Clear Grit. Postoffice, New Hamburg.

S. C. Rodd, veterinary surgeon, Woodstock, is a graduate of the Ontario Veterinary College. He settled in Woodstock in 1887, and has become popular with the horsemen of his section. He has opened a horse infirmary where he is prepared to receive horses for treatment. He will also buy and put in training good horses for the market. All calls responded to cheerfully, night or day.

W. B. Thornton, of the Prospect Hill Farm, three and one-half miles from Woodstock, is a breeder of Jersey cattle, carriage horses, and Southdown sheep. He has a fine mare, by Toronto Chief, dam a Goldstut mare, with record of less than three minutes; Blackbird by Ivanho, dam a running mare, record 2:50; a stallion Strachino, by old Strachino; and a fine filly by Sirocine (imported). His Jersey herd has several pure bred animals. Mr. Thornton also breeds trout, and can furnish them at all times.

Neil McIntosh is a breeder of heavy draft horses, and has been in the business many years. One of his early animals was the imported Clydesdale stallion Royal Times. He owns Samgler, by Royal Times (1,808), a stallion second to none in the county. Queen, by Marquis of Lorne, dam by Scotchman, is one of the finest brood mares in the county. Mr. McIntosh has a fine farm of 125 acres, known as Bentavrie. His post-office is Brenar.

J. Henderson, Belton post office, breeder of and dealer in heavy draft horses, and owner of imported Clydesdale stallion Killin Boy (3,724, S. C. S. B.; 318, C. S. B.) sire Laird of Aboyne (2,688) dam Metal of Primrose (2,688).

Edward Dingman, importer and breeder of Clydesdale horses, has imported a number of horses; among them Fulliegorn, vol. X, foaled June 3d, 1886, sired by Cairnbrogie (1,993), or Macneillage (2,992), dam Daisy of Hillhouse (5,360). Wait on Me, vol. X; sire Pickwick, dam Jean of Bardmory. Major Neil (4,571), sire Genevri Neild dam Jean of Melbank, Prince George (1,637), sire Bounty, dam Jip of Harestone. Postoffice address, Maplewood, Oxford county.

John Hart is a breeder of shorthorn cattle, two and one-half miles south of Woodstock. His herd is well selected, having twenty registered animals of the Bates strain of blood. He owns Duke of Chesterfield of the Kirk Lexington strain. Mr. Hart's reputation as a farmer and breeder insures him ready sale for his stock.

Budd & Bro., are proprietors of the Central Carriage and Blacksmith Shops, Woodstock. They are practical mechanics and keep first-class workmen. They had nine years experience in Cleveland, O., where they shod some of the noted horses on the turf. They are prepared to do anything in the shoeing and plating line, and have the custom of some of the best horsemen of Woodstock. Their carriage work has given excellent satisfaction.

S. P. Thompson is proprietor of the Crown Livery and Sale Stables of Woodstock. He has a fine stock of horses and vehicles, and furnish a rig to suit the most exacting. He keeps stock for sale, and does a good business caring, boarding, and breeding horses. He owns the fine roadster Pearl, a light-weight hunter, by Princeton, dam by Flying Dutchman. Pearl is said to be the best saddle horse in Ontario.

Valentine Fitch owns Maple Leaf farm of three hundred and fifty acres. His herd comprises fifty registered animals of the Strathallen, Princess, Cameron and Bates families. Among them are Duchess of Aylmer VI., by Highland Duke, Wimples Diadem by Lord Ytham (18,265) imported, and Polyanthus XII. by Louis Strathallen. His stock took twenty-three prizes at one show. Mr. Fitch also breeds pure Cotswold sheep, heavy draft horses and Berkshire swine. His postoffice is Oriel.

James Kennedy, proprietor of the North American hotel, Woodstock, is owner of a fine farm of one hundred and six acres and is breeding some fine road horses. Mr. Kennedy is a genial, courteous landlord and well calculated for the business he is in, having made it very successful.

J. D. Case is one of the leading blacksmiths and horsehoers of Woodstock. Thoroughly understanding shoeing and plating he does the work of some of the noted horsemen of Woodstock. He is a practical mechanic and has built up a good trade on the merits of his work.

Thos. Lee & Bro. are owners of Fairview farm five miles southeast of Woodstock, postoffice Oxford Centre.

Thos. Lee is engaged in breeding thoroughbred Lincoln sheep, Berkshire swine, and high grade shorthorn cattle. The farm consists of two hundred acres and has fine facilities for handling stock. Mr. Lee raises some heavy draft horses and always has on hand for sale good work teams, Berkshire swine, Lincoln sheep, and good cattle.

W. B. Baskerville is proprietor of the largest livery stable in Woodstock. He has been in the business for five years and in the line of top buggies, phaetons, light driving and commercial wagons has just what is wanted. Mr. Baskerville also buys and sells horses. He has a host of friends who are always ready to turn trade in his direction.

G. S. Brock, V. S., of Thamesford, graduated from the Ontario Veterinary College in 1884. He soon after located in Thamesford where he has worked up a fine business. He keeps a fine lot of driving horses and carriages for the use of the public, and in connection with his livery has an infirmary supplied with all conveniences for the treatment of horses placed in his care. The doctor is owner of a very fine roadster sired by Black Hawk Morgan. All calls are answered promptly, night or day.

W. H. Millman is one of Woodstock's most enterprising merchants, having been in the past seven years in the wholesale and retail grocery business, and a direct importer of China granite, having a large handsome store, the upper floor of which is used as a China hall. He is also a large exporter of apples. Mr. Millman's pluck and energy are not confined however, to mercantile pursuits, as we found by a visit to his large stables in the center of the town. He has from his youth been a lover of the horse, and during one of his annual trips to Europe bought and imported three Clydesdales and two Shires, four of which he sold, retaining Prince of Hutton (4,646) sired by the famous Prince of Wales (673), dam Jane of Mideroft (4,584). Mr. Millman has just returned from Europe bringing out a fine array of Shire and Clydesdale brood mares, Clydesdale stallions, a registered Yorkshire coach horse and a registered Hackney. He also has on hand four Shetland ponies and he has imported for his children a pretty pair of Irish donkeys. Mr. Millman's stock is all for sale and at no fancy prices.

Joseph Lorimer, of Fairview, is a breeder of draft horses, and has some of the best of their kind in the county. The following will indicate the character of his stock: Nancy, by Heart of Oak, dam by Comet, Polly, by Red Douglas. Mr. Lorimer is one of the best known of horsemen and takes pride in raising the best stock in his line. Buyers will always find something good in his stables.

Duncan McMillan, owner of Macbride Farm, is a breeder of Clydesdale horses and owns one of the best spans of brood mares in the county. They took first prizes and diploma in 1885, and first again at London in 1887. Mr. McMillan has been for many years one of the representative breeders of Clydes in his township, and as he always has superior stock on hand, buyers will do well to correspond with him.

A. J. McCarty, owner of McCarty's livery, Ingersoll, always has on hand good teams and fine carriages. He is also extensively engaged in buying and shipping horses. He owns the fine standard bred stallion John Howard, sired by John E. Rysdyk, he by Knickerbocker (200), he by Rysdyk's Hambletonian, sire of Dexter (2174); 1st dam Jule. He also owns two Canadian bred stallions, Young Superior and Pride of Fairview, sired by the imported Clyde stallion Superior. Both are descended from the champion Clydesdale stallion of Scotland, Prince of Wales.

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GROUP OF BERKSHIRE PIGS.
Imported by and the Property of Mr. HAROLD SOWBY, of Gowerock, Ont., near Guelph.



Harry Rice is proprietor of the Central House, Woodstock. The Central is a first-class house in all respects. Mr. Rice is also one of Woodstock's horsemen. His mare Maud E. by Moonstone, dam by Royal George has traveled in 2:50 without training. His colt by Dillard Wilkes, he by Red Wilkes, he by Geo. Wilkes, dam Maud E., has all the points indicating speed and is a fine colt.

John Rock is proprietor of the Spencer Flour and Lumber Mills and the Otter Valley Stock Farm. He is a breeder of shorthorn cattle and trotting and road horses. He owns the magnificent trotting stallion Dr. McDonald, sired by Whistle Jacket, dam by old Clear Grit, second dam by Royal George; also another fine colt by Whistle Jacket besides numerous other fine ones in the roadster class. Mr. Rock owns one of the best herds of shorthorns in the county. Welland Champion, August Rose, Norwich Fanny, Princess, Empire (14,707), and numerous other fine animals indicate the quality of his stock. He always has good stock for sale. His postoffice is Springfield.

M. C. Bell & Bro., owners of Plum Brook Farm, Springfield, are breeders of shorthorn cattle, Shropshire sheep and Berkshire swine. They succeeded their father R. Bell who was many years in the business. They aim to raise the very best stock and any selections made by them for addition to their herds have always been from breeders standing in the very front rank of their business. As a result their stock has never been shown without taking a prize and numerous first prizes at the various fairs have been awarded them. M. C. Bell & Bro. are thorough breeders and persons desiring good stock would do well to write to them.

Mr. G. F. Gurnett, proprietor of the *Chronicle and Canadian Dairyman*, takes a keen interest in stock matters and there is always something good in horse flesh to be found at his stable, which, by the way, is a model of neatness, comfort and convenience being built three stories high, the first story of stone, partly under ground, thus securing warmth in winter and coolness in summer. On a recent visit we saw a two year old gelding which shows every indication of being extra speedy. Already although broken but a few months he shows a fast gait. He is a golden chestnut by Ridgewood, a son of Rysdyk's Hambletonian 10., out of a fast road mare, her sire being by Jack the Barber, her dam a daughter of Harper by Lexington, grandam by Hambletonian Rattler. He is a strongly built fellow, handsome and as promising a two year old as we have seen for a long time. Mr. Gurnett also owns a handsome seven-eighths bred Judge Curtis-Milton mare, five years old, sixteen hands high, a splendid all day driver, broken to saddle and a great jumper. We also noticed a Fearnought pacer who can get along the road in pretty lively order.

Staebler & Morlock, of Tavistock, are dealers in dry goods, groceries, hardware, crockery, etc. They make tailoring a specialty.

Geo. A. Forbes, of Woodstock, is proprietor of the Commercial Hotel, the leading house in town. The Commercial under its enterprising landlord is a very popular hotel and well patronized by commercial men. Mr. Forbes is the owner of some very fine horses, among them we may mention the standard bred trotting stallion Blizzard foaled in 1884 (No. 3,751) by Onward (2254) son of Geo. Wilkes (222) and Dolly, dam of Director (217) and Thorndale (2224), by Mambrino Chief; also Mamie C. (2405) black mare by Chicago Volunteer sire of three in the (230) list, dam Carlotta, dam of Tom Rolfe (2224), by Fearnought, Jr., (226). Mr. Forbes has other fine horses but the above will show the fine quality of his stock.

M. T. Buchanan, mayor of Ingersoll, is a manufacturer of hay forks, hay carriers, etc. Of late years he has taken quite an interest in the Clyde horse, having imported five pure bred stallions from Scotland during the past two years, two of which he still owns. Bold Lyon (No. 4,064), imported December 1886, foaled 1884, is a fine animal and has won prizes before and since his importation, having taken first prize at Woodstock and 2nd prize and diploma at Springfield. Bright Bay imported in June 1887 is another fine bred horse, full pedigreed and registered in the stud book. Mr. Buchanan keeps a span of 2:50 geldings for his own private use. Persons in want of a good horse can usually be accommodated.

ELGIN COUNTY.

R. Row & Son, owners of Pleasant Valley stock farm, are importers and breeders of Cleveland Bay, English shire and Clydesdale horses. They have the following fine animals, Masher, a Shire stallion, by Nabob, a perfect specimen of the Shire horse and winner of many first prizes; a fine stylish Cleveland Bay stallion imported at the same time as Masher; and a Cleveland Bay mare, a winner of many first prizes in England. They have many other animals of equally good blood, and have sold many of their stock in the States. Messrs Row & Son will make a specialty of English shire and Cleveland Bay horses, and persons desiring anything in this line would do well to write them at Avon postoffice.

Sheldon Ward, of Aylmer, Malheur township, has served as reeve of his township for several years, and as he can be relied upon for honesty and fair dealing, he has always succeeded in selling his fine horses at good prices. He deals in fine bred roadsters and his brood mares are from the most celebrated trotting stock. Parties desiring fine stock in this line should write to Mr. Ward. Mr. Ward also deals in pure Berkshire swine and Leicester sheep.

Rock Bailey, of Oak Grove farm, Yarmouth postoffice, is the most extensive importer and breeder of the thoroughbred American Spanish merino sheep in Canada. His flock now numbers three hundred, and his success in this line encourages him to proceed still further. He has lately imported a ram purchased from E. Randall at a great price, and hopes to improve, if possible, his already fine flock. Mr. Bailey is about to introduce Jersey cattle on his farm. His poultry are pure Langshams, Plymouth Rock and Black Hamburg.

Joseph Philp, Sparta postoffice, is a good farmer and raises thoroughbred stock. His colts of Toronto Chief and Hambletonian stock are some of them showing signs of great speed. He has a fine shorthorn Durham bull of high pedigree, which cost him a large sum. His sheep are a cross with Leicester and Spanish Merino, his swine a cross of Suffolk and Berkshire. Mr. Philp prides himself on a large flock of poultry of the Plymouth Rock and White Leghorn breeds.

Wm. McClellan, of St. Thomas, is the most enterprising horseman in this section. He has imported and now owns several famous stallions, among them, Horace, of the old Hambletonian stock, who is a picture of the sire and noted for speed and beauty. He also owns the fine Clydesdale stallion Public Opinion, the inbred stallion Hambletonian, raised by Robert Bonner, and the stallion Morgan Rattler. Mr. McClellan has three very fine brood mares, one St. Lawrence, and Toronto Chief can trot a mile in three minutes.

Duncan McGregor, Mapleton postoffice, South Dorchester, has a fine farm and the best of farm buildings. His horses are the English draft and good native stock. His dairy cows are a cross with pure shorthorns and

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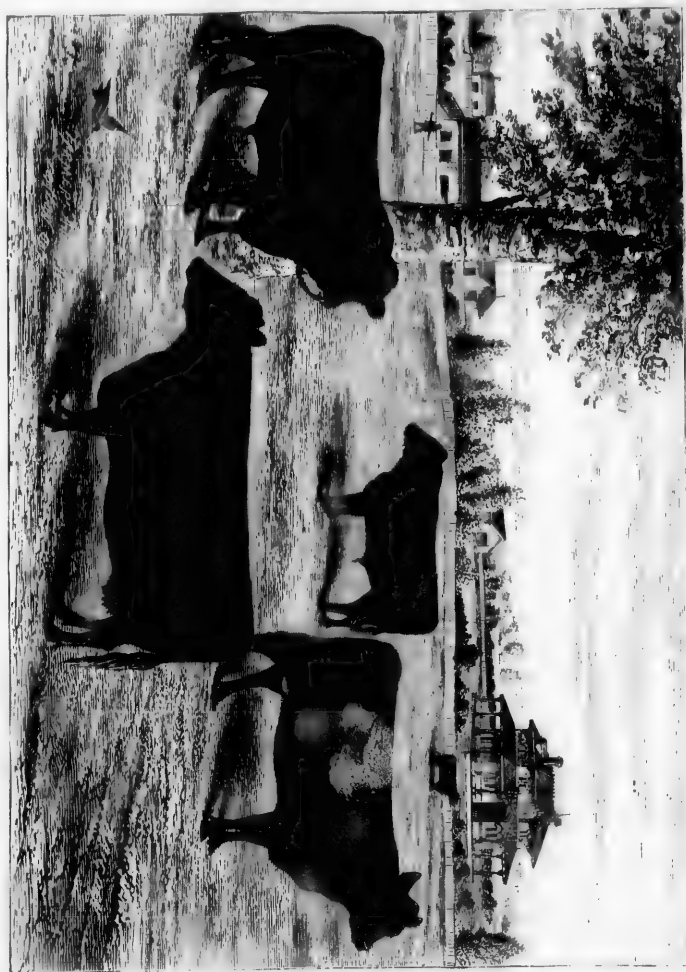
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GROUP OF PRIZE GALLOWAYS
And Residence of H. Sobey Esq., Goreock P. O., near Guelph, Ont.



Galloways. He has tried this cross for many years and is satisfied with it, but as he likes to experiment he has purchased a Polled Angus bull to cross with his present stock. Mr. McGrover's stock are all modern, so that he is in no danger of being gored. He has fine Berkshire and Suffolk swine and the best White Brahma chickens to be found.

T. S. Hare, Aylmer postoffice, Malahide, is well and favorably known as an enterprising stockman. He has a fine herd of Ayrshires, his dairy cows numbering thirty. He has a fine class of horses closely allied to the old running stock represented by Eclipse, and old Lexington. He also raises pure Berkshire swine.

F. W. Adams, Aylmer postoffice, South Dorchester, is one of the best farmers in this section, and takes great pains with his fine stock. He has two thoroughbred shorthorn bulls, two thoroughbred shorthorn cows, and a noted stallion sired by the famous Hambletonian, dam by Royal George. He has thirty good dairy cows, pure Berkshire swine and Leicester sheep.

J. C. Dance, Kingsmill postoffice, South Dorchester, is an extensive farmer, and his farm is stocked with the most approved breeds of cattle. His draft horses are a cross with French and Clydesdale, and he has many fine young horses of the Lapidist stock and a fine stallion sired by the celebrated Orpheus. Mr. Dance is a large shipper of cattle to Europe.

Lewis Pierce & Son are owners of a large livery and sale stable in Aylmer. They have first-class rigs at all times, and can supply customers with fancy or general purpose horses. They have a farm near by which furnishes hay and grain for their stables.

Hiram J. Brown is the owner of three hundred acres of choice land adjoining the flourishing town of Aylmer and is the most enterprising man in town. He is proprietor of the Brown House, has erected several good buildings and given the land to open out several streets. His farm is well stocked with choice horses, cattle and swine.

Wm. Harp, Aylmer postoffice, Malahide, owns some very fine stock. His stallion Judge Curtis, sired by Lexington, thoroughbred and registered, is sprung from the most celebrated imported horses, and is among the best in this section, always taking first prizes at the fairs. He has shorthorn and native cattle, Berkshire and Chester white swine and Leicester sheep. He also has some large game and Leghorn chickens.

Jarvis Thayer, Dunboyno postoffice, Malahide, has a fine farm yielding him good profits every year. His horses are of the Clear Grit and Hornpipe stock, and he has some Royal George colts, a fine Clydesdale brood mare and a stallion of the Lapidist and Hornpipe stock. He raises shorthorn cows, pure Berkshire and Poland China swine and Plymouth Rock chickens.

E. M. Yarwood, St. Thomas, is a retired banker, living on his beautiful farm just outside the city limits, where he keeps the finest stock in the vicinity. His thoroughbred stallion Lord Derby is considered the best in this section. He has six brood mares of the highest breed, one by St. Lawrence, and one by the celebrated Trumpeter, and several promising colts. Mr. Yarwood intends to increase his interests in thoroughbred horses. In addition to his horses Mr. Yarwood owns a thoroughbred shorthorn bull of the Booth family, shorthorn dairy cows and pure bred Berkshire swine.

Freeman & Anger, Dunboyno postoffice, Malahide, are the most thriving general blacksmiths in this section of the country. They take pains to do the best work, and their shop is always thronged with business. Their experience in the art of shoeing horses enables them to do work in this line most satisfactorily.

Kinsay Albertson, Sparta postoffice, Yarmouth, is a good farmer, and takes great pains with his thoroughbred stock. He has Lambeth Duke, a thoroughbred shorthorn Durham bull of high pedigree, and a fine cow Lady Elgin, got by King of the Forest. He has many fine bred animals, and intends keeping his stock pure to supply customers desiring fine stock. He has a fine span of horses of Clyde and native stock. His swine are improved Berkshires, and his fowl, the Heathwood games, he thinks are the best in the world.

Charles Wait, of St. Thomas, is considered one of the most expert blacksmiths in the city. Owners of valuable horses come long distances to his shop, and, as a consequence, he is always crowded with work. No horse is allowed to leave his shop until the shoes are properly fitted.

David Liddle, of Aylmer, one of the best blacksmiths in Canada, prides himself as a horseshoer, and the way he shoes so pleases the owners of fine horses they come long distances to his shop to have work performed.

Medcalf & Son, Sparta, are importers of Shropshire sheep and have expended considerable money in securing the best specimens of this class. Their dairy cows are a cross of shorthorn and good native stock. They have horses of the Sir William Wallace stock, and pure improved Berkshire swine. Their fine farm is well stocked with well-bred young cattle.

J. G. Gunn, of Springfield, prides himself on always having superior horses, and delights in seeing them look slick and fine as the goods in his Springfield store. He owns Lady Stanton by old Gen. Stanton, dam by Ethan Allen, and Sally Snow by old Clear Grit, dam by St. Lawrence. Mr. Gunn has several promising colts and one fast pacer, and devotes considerable time to his horses when not engaged in his general store.

Clinton Vanpatter, Dunboyno postoffice, is the most extensive farmer in this section, having a large stock of well-bred horses and cattle. His horses are of the Lapidist stock, his only fancy, and he generally keeps a stallion of his favorite breed. His dairy cows are good grade short horns, and his swine are pure Berkshire and China White. Mr. Vanpatter is preparing to stock his farm with his favorite breed of horses, and has several promising colts on hand.

Geo. Deo, New Sarum postoffice, Yarmouth, is one of the most extensive breeders of pure American Merino sheep in this section. His flock now numbers over fifty, and takes prizes at every agricultural show. He is about to increase his flock by adding some very valuable specimens in order to fill orders. He has a good stock of native cattle which he is about to cross with thoroughbred Holsteins.

Wesley Pound, Springfield postoffice, Malahide, is a good farmer and keeps Percheron horses, shorthorn and native cattle, and Chester white swine. He has the best thoroughbred shorthorn bull in this section.

Wm. D. Hillborne, Sparta postoffice, Yarmouth, keeps a large herd of cattle, all nearly thoroughbred shorthorns, his dairy cows numbering thirty. His horses are of Toronto Chief stock. He has Berkshire and Chester white swine, Leicester and Shropshire sheep, and Brahma and Cochins fowls. He is one of the best farmers in Canada.

Thos. and Robt. Roberts, Sparta postoffice, Yarmouth, are owners of six hundred acres, and the most extensive farmers in the township. They keep thoroughbred shorthorn bulls, and cross the native stock with pure shorthorns. They have several horses of the famous Duke of War stock, also improved Berkshire swine, and a fine flock of Southdown and Leicester sheep.

Noble Tufford, Dunboyno postoffice, Malahide, is a good farmer, and takes great care of his fine stock. He has some fine road mares of the Royal George and Toronto Chief stock. He has a thorough-bred bull Royal George, and shorthorn and native cows, also Berkshire and Poland China swine, and Southdown and Leicester sheep.

Marwood Ashton, Port Ponce postoffice, Malahide township, is the most extensive farmer in the town, and a large breeder. His horses are crosses of the best native stock and pure Fecsheron. He has a pure short-horn bull, and his dairy cows are shorthorn and native stock. His swine are Berkshire and Chester White, and his sheep are pure Leicester.

Fulton Bros., Fingal postoffice, are extensive dealers in horses, always priding themselves on having the best goods on the road. Their farm is always stocked with first-class horses, such as Toronto Chief and Hambletonian, and they ship fine stock to the English market. In addition they are extensive dealers in walnut and other hardwood lumber.

Edwin Price, M. D., Aylmer postoffice, Malahide, was retired from his practice as a physician, and engaged in farming, and is one of the most extensive buyers in this section. His farm is always stocked with fine cattle, always for sale. His sheep are pure Leicester, his swine pure Berkshire and Poland China. He has a fine span of horses of Lapidlet and Toronto Chief stock.

H. W. Lumley, music dealer, Ridgeway, Ont., breeder and importer of light harness horses, owns the standard bred colt, Strogoff, No. 3,114, which he bought from the Kalamazoo stock farm, when a yearling, sired by Grand Sentinel. First dam Molly, three years old, record 2:50, by Grey Fearnought by Fearnought, (22,314); second dam Nell by Fisk's Mambrino Chief; third dam Sly, by Vermont Hero; fourth dam by Duroc. This colt is a trotter, and will make a great stock horse. He also owns the standard bred horse, Jim Putnam, (6,113), sired by Rescue. First dam Ronoy, dam of Frank Landers 2:18½, Roscoe 2:24½, Gladys 2:31½. Jim Putnam is a full brother to Roscoe 2:24, and can beat 2:30.

Edward C. Scarlett, Forest Stock Farm, four miles south-east of Ridgeway, owner of the celebrated Temperance Stallion Confidence, sired by Tempest, sire of Fulton 2:30, Lady Franklin 2:24, and several others; he by old Royal George. Confidence's first dam by Master King (imported) gr. dam Duroc, Messenger, g. g. Morgan. Confidence is one of the handsomest horses living; 16½ hands, beautiful chestnut, and a born trotter, and sire of Nellie Woods 2:33½, Confidence, Jr., 2:31, sire of the Beauty carriage team that sold for \$2,700, and several other high priced ones. Mr. Scarlett makes a specialty of breeding and matching. Fine carriage teams for sale. He also has several fine brood mares on his farm, and parties wanting carriage horses should call or address, Edward Scarlett, Forest Stock Farm, Ridgeway, Ont.

KENT COUNTY.

A. H. Huff, of Chatham, owner of Indian Creek Dairy and Stock Farm, has been in the dairy business over twenty years. He milks about thirty cows the year round. He has the following registered shorthorns; see Canadian S. H. Register. Miss Daisy, (402, vol. 7). White Rose (403, vol. 7), Miss Fannie (58, vol. 5). Roan Jack (2, Dominion S. H. B.), and many others. He has four cows, which, for quality and quantity of milk he challenges Ontario to beat.

McGarvin Bros., Chatham, are breeders and importers of French draft horses. We give the pedigree of one of

their stallions to show the quality of their stock. "Vol. 5, National Registry of French draft horses. Registry 4,566. Stallion Farrand, imported April 6, 1886, by McGarvin Bros., bred by Paul Castel, sired by Favori, dam Poulotte." This stallion is a fine specimen of the breed. McGarvin Bros. took the first prize and medal at Toronto, for mares of any age.

Thomas Heatherington, of Cedar Springs, is a breeder and dealer in standard bred roadsters. He owns Rosa B. and Lady Mack, by Hambrino 2:25½. He has a fine truck on his farm where he trains his horses.

Henry Smyth, box 241, Chatham, is a breeder of registered shorthorns. He has thirty-eight in his herd at present, among them 3d Crown Prince of Strath Allan, whose mother was imported. Mr. Smyth breeds for milk and beef combined. Having been a farmer, he is generally known as California Smyth.

Win. B. Rowe, a veterinary surgeon, of Ridgeway, is a graduate of the Ontario Veterinary College, Toronto, and a member of the Ontario Veterinary Medical Association. He treats diseases of domestic animals in an efficient and qualified manner. His office is on Erie street, south, opposite the Methodist church of Canada.

F. W. Charteris, of Chatham, succeeds his father as breeder of registered shorthorns, at "The Beeches." He owns (see Dominion S. H. B.), 10 Earl of Darlington (8,870), Lady Ianthe (13,662), Lady Louisa (13,663), Princess Viola (13,664), Veronice (13,665), and many others. At their last annual sale their stock averaged one hundred and ten dollars to the head.

W. D. Tristram, of Chatham, horse-shoer and farrier, has the confidence and trade of the importers and breeders of his locality. All his work is done on the most approved plan. Weak heels, sand cracks, quarter cracks, drop soles, corns, interfering, and acute and chronic laminitis are scientifically treated. His shop is on Fifth street.

T. S. Durgin, of Dresden, is a breeder of fine horses. He is the owner of Abdul and Alkad. From Wallace's American Register, vol. 4, we find: "Abdul b. h., foaled 1876, got by John E. Rysdyk, g. d. of Knickerbocker (200), dam Doll by Wild Deer, g. d. the Duroc mare by Duroc, bred and owned by T. S. Durgin, Rothwell, Ont." We also find "Alkad, 1st dam by Adels Warrior, son of Royal George, 2nd dam bred by Mr. Turill, sired by Sprig, son of Boiler old Fox Hunter, a roadster prince and prince of roadsters; 3rd dam by Knickerbocker, sire of Gen. Mack's dam, record 2:35." Mr. Durgin never leaves his stables, and his stock is evidence that blood will tell.

John Reed, postoffice, Chatham, is a breeder of shorthorn cattle and Clydesdale horses. His arrangements for feeding and sheltering stock are perfect. He purchased as delegate from a farmers club for three hundred and fifty dollars, the bull Bawn Babraham 4th, (10991 Canada S. H. S. R., vol. 8), when twenty months old. He owned Athelstone 2d, (vol. 4, 1902), which, at eight months old, weighed one thousand pounds, and sold for three hundred and fifty dollars.

Geo. Lewis, postoffice Chatham, is owner of the Perceneron stallion, Young Louis Philip, which was raised on his farm. He also owns the fine young Clydesdale stallion, Young Ontario Chief, whose dam took first prize at Guelph, 1874, also at Hamilton.

John Paxton, postoffice Chatham, director of the Kent County Agricultural Society, is a breeder of registered shorthorns. He has some superior grade cattle. His bull, Christmas Joy by Brampton Hero (278 B. A. H. B.) will indicate the quality of his stock. Mr. Paxton has made several sales to persons from the States.



NAPOLÉON—2712.

The property of P. Whelihan, Thornhill Place, St. Marys, Ont., Importer and Breeder of Norman Percheron horses.

Albert Ayres and S. L. Mann, comprising the firm of Ayres & Mann, are proprietors of a first-class livery at Wallaceburg. They own the prominent young stallion Starlight, sired by Gen. Brock, 2.31½, he by Old Rooker. His dam was by old Bob Hunter 2.36, her dam being an Ethan Allen mare. Starlight was bred and raised by his present owners. Ayres & Mann have many good roadsters and several promising colts, all of their own breeding.

Geo. Hill is proprietor of the River House, Wallaceburg, and the owner of some fine trotting horses. As a genial landlord, he is known throughout Ontario. An expert fisherman and crack shot Mr. Hill is always ready for a sporting trip, and many of the boys come from Toronto and other points to enjoy an outing with mine host. Mr. Hill owns his own steam yacht, which pulls his flotilla of fishing, hunting and sleeping boats out on St. Clair Flats. His outfit is as complete as any sportsman's in Canada.

Dr. Jonathan McCulley, of Cedar Springs, has been a breeder of registered shorthorns for several years. A good sample of his stock may be seen in Princess 2d of Kent No. 417, vol 5.

Thomas Taylor, of Harwich, is an importer and breeder of Clydesdale and Cleveland bay horses. He has been many years in the business, always going abroad to make his own selections. Several of his importations can be found on best stock farms in the States. Craigie (18, 1051 and 2,039) was imported August, 1882. His pedigree shows him to be descended from the best strains of Clydesdale blood in Scotland. He has taken eight first prizes at various fairs.

Thomas Russell, of Charing Cross, owner of the Cedar Stock Farm, is one of the representative breeders of Leicester and Cotswold sheep and Suffolk pigs. His stock has taken one medal and several diplomas and first prizes at the fairs. Those desiring stock in his line would do well to correspond with him.

W. R. Laidlaw, veterinary surgeon, Blenheim, is a graduate of the Ontario Veterinary College, Toronto. Office and residence on Main street.

Wm. Burgess, of Cedar Springs, is the owner of three registered Clydesdale stallions; 3,182 Shyluck, 1,915 Ardgowan and 65 Crown Prince. Shyluck, when a yearling, was bought by Mr. Burgess for one thousand dollars. Ardgowan was imported when a yearling, and shortly after took the second prize at Ottawa. Shyluck and Ardgowan are registered in the stud book.

Wm. Taylor, of Weldon, is the owner of the celebrated imported stallion Disraeli. Disraeli is a Cleveland bay, seven years old, and was imported in August, 1882, by Thomas Taylor, brother of the present owner. Mr. Taylor is also a breeder of registered shorthorns.

Charles McGuigan, of Cedar Springs, is a breeder of registered shorthorns. He has a fine herd of registered cattle, and has won many medals and first prizes. His bull Erie Prince (12,035) is a very fine animal. Mary Bell, a cow, (Dominion S. H. H. B.) is a good example of Mr. McGuigan's stock.

S. C. Bogart, veterinary surgeon, Chatham, is a graduate of the Ontario Veterinary College, Toronto. He has a large practice and the best of facilities for treating diseases in animals. He has a large sale and lively stable on Market square and Wellington street.

John Steen is a veterinary surgeon at Chatham. He is a graduate of the Ontario Veterinary College, Toronto. Diseases of domestic animals are treated in an efficient and qualified manner. His office is at Pierce's stables, Market Square.

Wm. Chrystler is proprietor of a first-class livery at Chatham.

James Jenkins, Colborne township, is a breeder of shorthorns and roadsters. His registered bull (all new book) The Minister, was bred by Hugh Thompson, of St. Mary's. His farm is in a high state of cultivation, and convenient to Goderich.

Alexander Bogle, postoffice Goderich, is owner of Archus Bourbon, bred by R. F. Aikers, Kansas. His sire was Bourbon Chief, sire of Calmar, record 2.23½; son of Mambrino Chief, first dam Lily by Little Arthur; second dam by Gill's Vermont, sire of Bonner Boy; record 2.23. Mr. Bogle has several fine colts and can furnish some good roadsters.

H. W. Clark, lumberman, of Wallaceburg, was born in New York, later removing to Michigan, and finally to Canada. Mr. Clark having the eastern enterprise and tact is properly speaking a hustler.

John Robinson, horseshoer, of Dresden, has the trade of good horsemen in his vicinity. Thoroughly knowing the anatomy of the hoof, he treats all its diseases promptly and properly. He makes treatment of interfering a specialty.

Malcolm Campbell, of Maple Grove Stock Farm, two miles south of Erie street, Ridgeway, is a breeder of registered Canadian Clydesdale horses. Stud colts and fillies for sale.

Louis H. Side, of Wallaceburg, is a horseshoer, and has the confidence of the horsemen of his locality. He makes a specialty of diseases of the foot. He believes the speed of the horse is many times governed by the shoeing, and is making a scientific study of his business.

Shepherd Somers, proprietor of the Windsor House, Wallaceburg, is owner of a promising young Royal George stallion, dam by old St. Lawrence. Mr. Somers has a good farm near Wallaceburg, where he is breeding some fine steppers. Persons wanting a horse to do three minutes or better, would do well to write to him.

John Murphy, of Wallaceburg, dealer in groceries and provisions, is a lover of fine horses, having one of the best roadsters in the place, whose sire and dam are direct descendants of standard bred stock. His colt is a dark iron grey, very rangy, plainly showing its breeding by its many good points and speed. Mr. Murphy is about to move into a large brick store he has lately erected near the postoffice.

John A. McLean, Wallaceburg, is a breeder of thoroughbred roadsters and proprietor of a first-class livery. He trains his horses at the Woodbine Driving Park, which is situated on his farm. He owns a black mare which he claims can make ten miles per hour for ten hours. His judgment is good, and he is often called upon to purchase for people abroad.

Charles Willmore is manager of the Roslyn Stock Farm of Angus Sinclair, Chatham. He has under his care seventy-six stallions and roadsters, many of them standard bred. He has ten stallions imported and registered. Mr. Willmore is a careful and expert horseman.

John Little, Chatham, is a breeder of registered Berkshire pigs. He owns the promising young stallion Young Craigie, whose sire was Craigie, imported by Thomas Taylor. Mr. Little has several good brood mares and is making a specialty of Clydesdale horses and Berkshire pigs.

S. S. White, Charing Cross, has been for many years a successful breeder of thoroughbred Southdown sheep. He has the best facilities for shipping. His standing in the county guarantees to purchasers quality and blood in animals bought of him. Mr. White is a firm believer in blooded stock, and has lately engaged in breeding registered shorthorns. Correspondence solicited.

Joseph Kime is a veterinary surgeon of over twenty years' practice in England and Canada. His address is Chatham, Kent county, Ontario.

Joseph Wilson, Wallaceburg, is a breeder and dealer in roadsters. He has several good standard bred roadsters. He is the owner of West Liberty or Jo Gale, and has several good brood mares and young horses. Mr. Wilson also owns a large planing mill and lumber yard.

D. A. Wilcox, Box 93, Chatham, has been engaged for the past thirty years in buying and breeding cattle; his experience in this line being equal to any in Western Ontario. He has a farm of 192 acres with his house pleasantly situated on the Thames. He also has large tracts of land in the Western States. Persons desiring a herd or less of cattle can rely on Mr. Wilcox's judgment to buy for them.

Henry Gillet, Oungah postoffice, is a breeder of registered shorthorn cattle and Clydesdale and English coach horses. His cattle are mostly from Lord Oxford (6,548, Canadian S. H. S. R., vol. 4.) Mr. Gillet has good grade Clydesdale and English draft horses.

James Brown, Ridley postoffice, is a breeder of registered shorthorn cattle, Clydesdale and trotting horses, and Berkshire pigs. Mr. Brown has been a resident of this county for over fifty years, and is recognized as one of the most reliable farmers in the community.

Robert Smith, Chatham postoffice, has a fine stock farm and is a breeder of French draft horses and shorthorn cattle. His farm is well adapted to breeding purposes, having large barns and good facilities for weighing, breeding and shipping stock. His residence is one of the best in the county.

John Wright, Chatham postoffice, has a fine farm of one hundred and fifty acres and is raising good grade stock. He has been warden of the county, and the many public offices he has held testify of his standing in the community.

Thomas P. Smyth, Oungah postoffice, is owner of the celebrated shorthorn bull Lord Oxford (No. 6548, vol. 4, Canada S. H. R.) Mr. Smyth has a fine farm of one hundred and fifty acres, and has good grades in cattle and horses.

John Grant, son of Wm. Grant, Chatham postoffice, has had charge of Young Craigie, and is considered a good horseman. He thinks a Clyde cross for the general farmer makes the best and most useful animal. On the farm of Mr. Grant are several thoroughbred shorthorns and brood mares from registered stock. Mr. Grant raises and deals in Berkshire pigs.

Joseph Thibodeau, jr., Dover township, is a breeder of horses. He has two good stallions, one Clydesdale two years old from Mr. Burgess' imported stallion Ardgowan, registered in the Scotch and Canadian stud book. He has some of the finest brood mares in this part of Ontario, among them Dolly 2d, No. 27 Canadian Clydesdale stud book, foaled April 17, 1880.

James Beattie is manager of the imported horses and stock of the Riverside Stock Farm, two and one-half miles from Dresden, of which W. T. Pringley is proprietor. Mr. Beattie is a brother of the great importer of Toronto, and thoroughly understands the management and treatment of stock.

Solomon Coffel, Wallaceburg postoffice, is a breeder and dealer in Ayrshire cattle. The character of his stock is shown by his bull Polar Star 2d, 1421 Ontario Ayrshire stock register, vol. 2, and by his cow Daisy 202, vol. 2. His surplus stock is sold at private sale.

J. N. McCoy, of Wallaceburg, is a breeder of shorthorn cattle and roadsters. His stallion Young Eagle, was sired by a running horse. His registered shorthorns

are among the finest in this part of the country. He has several farms and one of the best farm houses for miles around.

Robert McGarvin, Chatham postoffice, of the firm of McGarvin Bros., importers and breeders of French draft horses, is a young man of a progressive turn of mind. He believes and thinks he has good grounds for saying that the French draft horses for general purposes are far superior to any other thoroughbred or grade horses, and he has had some years experience to back up his assertion.

N. Webb, proprietor of China Hall, St. Thomas, and owner of Springbrook Stock Farm, Howard township, Kent County. The farm gets its name from a never failing spring brook, running through nearly every field on the farm. He has a fine stock of Cleveland bay colts and shorthorn cattle.

J. N. Willson, of Ridgetown, is a breeder of roadsters and Clydesdales and shorthorn cattle. He owns Major Rooker, sired by Rooker, dam by Royal George. He has several fine brood mares, Almonds, Bonairs and Rookers. His stock has taken several prizes at the Provincial and County fairs.

J. E. Cook has a first-class livery opposite the Idlewild Hotel, Chatham.

Geo. Murray, veterinary surgeon, Ridgetown, is also a breeder of Clydesdale and trotting horses. He owns three stallions, Ballmoleack, Jock and the Farm's Pride, all imported and registered Clydesdales. He also owns Amboy Chief, three years old, and winner of twenty-two first prizes in twenty-three exhibitions. Amboy Chief is by Rooker. Dr. Murray has a large practice in his vicinity.

Wm. Wallace is the owner of a fine farm on the Thames, near Chatham. Mr. Wallace is a gentleman of fine education, and is one of the best posted stockmen in the country. He was one of the first managers of the Bow Park Farm, and his rare judgment and skill in breeding have given him a high rank among the stockmen of Canada.

Thomas Redpath, of Wallaceburg, is proprietor and owner of the Oriental Hotel, and dealer in thoroughbred roadsters. Mr. Redpath always has some good horses on hand, and being a lover of fast horses, he is always bringing out their good points.

BRUCE COUNTY.

Frank Wilson is proprietor of the first class livery barns at Kincardine. He is known to all horsemen as a careful and expert trainer. He has had the management of some of the finest horses in Canada. Horses trained, bought or sold for parties as desiring.

WELLINGTON COUNTY.

Harold Sorby, of Gonrock, four miles south of Guelph, is a breeder of Galloway cattle and Berkshire swine, and also an extensive breeder of poultry. His herd of thoroughbred Galloways, numbering more than forty head, is known as the Alton Hall Herd; and contains some of the finest animals of that breed in Canada. Notwithstanding a very destructive fire which destroyed his barns and some very fine stock, Mr. Sorby is again in the front rank of breeders, and is prepared to furnish the very finest bred animals in his line to intending purchasers. The names and pedigrees of his stock he has printed in a neat catalogue. We give on another page a view of Mr. Sorby's fine property and some of his stock.

Isaac Groff, Giltou postoffice, breeds registered short-horn cattle, and is an exporter of cattle and horses. Is a well-known horseman, and extensive buyer and shipper of heavy draft, carriage and roadster horses, and enjoys the confidence of horsemen generally.

J. Hugo Reed, V. S. Guelph, graduated from the Toronto Veterinary College, in 1882, and located in Guelph, where he has won for himself a good practice and a good name among stockmen generally. Is a dealer in saddle horses, and an importer and breeder of trotting and road horses. In 1887 imported from Kentucky the promising young stallion Lexington, Junior, sired by the standard bred horse Lexington. Goldust, his dam, being Alice by Medock Morgan, and a standard bred mauling stallion Wilson Burr (No. 7, 191, vol. 7, Wallace's American Trotting Register), raised by Major Barr, he by Wilson, and he by George Wilkes; dam Ella B. by Red Wilkes, she by George Wilkes.

P. Spragge, Guelph, proprietor of a large and well-equipped livery, sale and boarding stable, is one of the most prominent, reliable and well-known horsemen in this part of the country, his name being as familiar as household words. Enjoys quite a local reputation as an importer and breeder of pure bred Scotch collie dogs, having sent a number of this kind to British Columbia. Horses bought and sold on commission.

Thos. Gowdy, Guelph, manufacturer of agricultural implements, is an admirer of good horses, and breeder of trotting stock from such fashionably bred brood mares as Sarah G. sired by Zilcadi Goldust (4,400), W. T. R. dam by Bunker Hill, a son of Green Mountain Black Hawk. (In 1887 Sarah G. was bred to Jerome Turner, record 2:15½.) Queen Goldust by Lexington Goldust, he by Goldmont, dam Alice by Medock Morgan, and he by Vermont Morgan. He also has some stock of the famous Tippeo breed.

Wm. Whitelaw, Guelph, Ont., breeder of registered shorthorn Durham cattle, and has for many years been a prominent and well-known importer and breeder of Borden Leicester sheep. Among his recent importations are some exceptionally fine animals from the herd of Lord Polworth, who is probably the most noted breeder of Borden Leicesters in Scotland; also breeds Shropshire down sheep. Mr. Whitelaw's herd of cattle consists of a number of fine females, mostly of the Bates strain, with a pure bred Cruickshank bull, (bred by John Dryden, M. P. P., of Brooklyn, at the head of the herd, and are all registered in the D. S. H. B. Keeps on hand both pure bred cattle and sheep for sale.

Smith Evans, Gourock postoffice, proprietor of Willow Grove Stock Farm, is an importer and breeder of Oxford down and Cotswold sheep. His stock are all either imported or bred direct from imported stock. Has exported a number to the States. Keeps on hand good young stock for sale.

Thomas McCrae, Janesville, Guelph, Ont., is an extensive importer, exporter and breeder of Galloway and Polled Angus cattle, Clydesdale horses and Cotswold sheep. Is the oldest and most widely known importer of Galloways in Ontario, or probably America, having been largely engaged in the business since 1861. His herd comprises many very fine animals, both male and female, and he seldom has less than from forty to sixty head on hand. His imported registered Clydesdale brood mares are first class, and their progeny by imported sires should deserve the attention of intending purchasers. Pure bred Clydesdale horses, Polled cattle and Cotswold sheep kept on hand for sale.

F. Sturdy, breeder of thoroughbred Jersey cattle and poultry, Guelph, Ont., has golden spangled Hamburgs, colored Dorkings, light Brahmas, Rouen duck eggs and chickens for sale.